

**Transmission and Commoditisation of Medicinal
Plant Knowledge in the Marketplaces of Oruro,
Bolivia**

A Thesis Submitted to the University of Kent
for the Degree of Doctor of Philosophy in
Environmental Anthropology

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August 2014

Abstract

This thesis analyses how Andean people's knowledge of medicinal plants and the relationship between environment and health is represented, transmitted and commoditised in the marketplaces of the department of Oruro, Bolivia. Considering the increase in urban population and their dependence on marketplaces for medicinal plant remedies, this thesis examines the role of marketplaces and the importance of specialist stallholders in the transmission of knowledge. The central research site of Oruro is a multi-cultural city located on the Andean plateau in southwest Bolivia, a population of Spanish, Quechua and Aymara speakers with a pluralistic medical system. Fieldwork was carried out over 18 months with market stallholders in Oruro combining quantitative and qualitative methods with ethnographic documentation of knowledge transmission events.

This thesis found that medicinal plant marketplaces in Oruro are highly regulated social systems that incorporate Andean socio-economic mechanisms, including ritual performance for the transmission of cultural knowledge, and the regulation of resource distribution and use. The development of a 'chemical landscape' model demonstrated that social exchange and trade between ecosystems and altitudinal zones broadens the spectrum of medicinal compounds available, contributes to the complexity of herbal mixtures and can limit exploitation of local plant populations. The market stallholders use specialist classifications that identify chemical properties, toxicity and variations between plant species and ecological regions. Plant classifications varied with the context and location in which they were used, and humoral classification enabled the selection and combination of plants in mixtures and justified remedy efficacy for specialists and non-specialists. Andean cultural beliefs including complementary opposites enabled transmission of knowledge on the medicinal properties of plants between highland consumers and lowland producers, and defined traditional Andean mixture efficacy.

These findings demonstrate that, although state intervention and identity politics are redefining perceptions of medicinal knowledge, the market exchange system centred in Oruro city creates localised specialist knowledge and continuity of cultural knowledge transmission.

ACKNOWLEDGEMENTS

To all the people who have helped to make this work possible through the preparation, fieldwork and writing up, in particular those who made me feel at home while in the field. In particular I thank my mother, and my wife and family who have been a constant source of inspiration and support. I express my gratitude to all participants involved in fieldwork and specially those traders in the marketplaces who shared their time and knowledge with me.

I am grateful to all the members of the Department of Anthropology at the University of Kent who have lent their support. I would like to thank my supervisor Dr. Raj Puri for his advice and comments. I am grateful to Prof. Michael Fischer for developing and providing data analysis software. I am grateful to Dr. Yoshimi Osawa, Dr. Calum Blaikie, Dr Josh Rickard and Dr Graciela Alcantara-Salinas whose work and insights added valuable dimensions to the dissertation, and am to indebted Mr. Rory McBurney for his enthusiasm and expertise. I also thank Dr. Simon Platten and Dr. Rachel Kaletta for their support, thoughtful comments and enthusiasm and Dr. Miguel Alexiades for his comments and support. I would like to thank Prof. David Zeitlyn for his support and guidance with preparing, writing and organising my work. Finally I would like to thank Prof. Roy Ellen for his support and whose work has provided an ongoing source of inspiration that has constantly challenged and drawn new and provoking questions for my own research.

My fieldwork was made possible by the support and encouragement of innumerable people. I am especially thankful to all the staff at the National Herbarium of La Paz Bolivia for their assistance with preparing collection permits and their ability to identify the most obscure and incomplete pieces of plant material. In particular I would like to thank Dr. Stephan Beck, Dr. Emilia Garcia and Lic. Monica Zeballos for their guidance and taxonomic identification skills. I would like to thank Lic. Simon Cocarico for his help in the identification of highland species and names in Aymara and Lic. Juan Pablo Ticona for his specialist identification and classification skills for lowland flora. Thank you to the staff of Asociación de Promotores de Salud de Area Rural, APROSAR, in

particular Don Anastasio Choque, Moises and Dr. Marco Herbas as well as all the volunteer community health workers for their support. I am indebted to Don Eusebio Arce Choque who welcomed me into his home, and for his support and translation skills with Quechua in the marketplaces. Thank you also to Marco La Fuente for his transcription skills. I am particularly grateful to the late Prof. Alberto Guerra for his friendship, kindness, mentoring, guidance and the wealth of information he shared with me during my stay in Oruro. His insights into the Andean culture, history and traditions along with connecting me to vendors and specialist healers were invaluable for my fieldwork.

Finally I would like to thank the innumerable traders, vendors and customers in the marketplaces for their conversation and participation. In particular I am grateful to Dona Nora, Hilda, Daisy and their families from the Mercado Fermin Lopez for their hospitality and guidance in culture, rituals and traditions, and to Doña Victoria, Basilia and Miriam from the Junin street market. I thank Don 'Justo' for his friendship and patience with the classification of maize cob varieties. Thank you also to the many others who are not mentioned here but have influenced and helped me and the administrative staff at the University of Kent Anthropology department. This work was funded through an ESRC/NERC award for postgraduate study with the University of Kent at Canterbury.

CONVENTIONS AND SYMBOLS

Introduction.

Throughout the text the following conventions have been used in accordance with other ethnobotanic and ethnographic works to distinguish between ‘local’ names, scientific names and English glosses. Whilst this can be misleading as to the exact meanings of words, it never the less provides a way for locating the words in their language of origin. I feel it is important to point out that this convention is by no means a gloss for a universal context or an overarching classification system for the names of plants, medicine or illness, into either local or scientific defined categories or structures but simply a way of identifying the linguistic origin of words with multiple cultural contexts.

Local names for plants, minerals, animals and medicines are in italics (e.g., *wira wira*) for the languages of Spanish, Aymara, and Quechua as well as combinations of these (i.e. Spanish and Aymara or Aymara and Quechua). These are not glosses or universal terms and care should be taken when comparing results of this study with other locations. Many word meanings are localised and used for different purposes in different regions. Where available a plant’s local name is followed by the corresponding botanic classification of genus then species in brackets. Again, care should be taken not to assume these are directly comparable, as local names for plants differ in different places, may refer to sub species and can change with the context they are used in.

Scientific taxonomic names are in italics (e.g., *Tagetes erecta*) for genus and species, with the genus having a capital letter. Botanic families are listed in the appendix with the first letter in upper case and previous family name in brackets e.g. Asteraceae (Compositae).

English glosses for local words and non English terms are placed in italics in the text followed by a translation in brackets of local meaning for the first time they are used e.g. *feria* (periodic market). These terms are also listed in the glossary.

TABLE OF CONTENTS

Abstract	ii
Acknowledgments	iii
Conventions, symbols and language	v
Table of Contents	vi
List of Tables	xi
List of Figures	xi

Chapter 1: Research Problem and Overview of Thesis

1.1	INTRODUCTION.....	1
1.2	THE ANTHROPOLOGY OF MARKETS AND MARKETPLACES	2
1.3	MARKET ETHNOBOTANY AND HEALTH.....	3
1.4	ETHNOBIOLOGICAL KNOWLEDGE SYSTEMS.....	6
1.5	RESEARCH QUESTIONS.....	8
1.6	ETHNOGRAPHIC BACKGROUND: MEDICINAL PLANT KNOWLEDGE AND EXCHANGE IN THE BOLIVIAN ANDES	9
1.7	FIELDWORK IN MARKETS.....	14
1.8	SIGNIFICANCE AND SUMMARY	18
1.9	THESIS OVERVIEW AND OUTLINE.....	19

Chapter 2: Theoretical Orientation

2.1	INTRODUCTION.....	22
2.2	ETHNOBIOLOGICAL KNOWLEDGE SYSTEMS.....	22
	2.2.1 <i>Folk Classification</i>	23
	2.2.2 <i>Ethnobiological knowledge transmission and distribution</i>	26
2.3	MEDICAL ANTHROPOLOGY AND ETHNOMEDICINE	33
	2.3.1 <i>Medical pluralism in an Andean context</i>	33
	2.3.2 <i>Ethnopharmacology</i>	35
2.4	ECONOMIC ANTHROPOLOGY OF MEDICINAL PLANTS	37
2.5	SUMMARY	42

Chapter 3: Methods and Methodology

3.1	INTRODUCTION TO METHODOLOGY.....	44
3.2	METHODS SUMMARY.....	47
	3.2.1 <i>Voucher specimens and botanic classification</i>	48
	3.2.2 <i>Folk classification</i>	49
	3.2.3 <i>Language</i>	49
	3.2.4 <i>Quechua and Aymara</i>	50
	3.2.5 <i>Spanish</i>	52
	3.2.6 <i>Market survey and quantitative data</i>	53
	3.2.7 <i>Semi structured and informal interviews</i>	54
	3.2.8 <i>Participant observation</i>	57
3.3	METHODOLOGICAL CHALLENGES AND PARTICIPANT OBSERVATION.	59
	3.3.1 <i>PIC, keeping secrets and ethics in the marketplace</i>	61
3.4	SUMMARY	64

Chapter 4: Setting. The Social and Cultural Context

4.1	INTRODUCTION	65
4.2	BOLIVIA: POPULATION AND ENVIRONMENT.....	66
	4.2.1 <i>Health in Bolivia</i>	69
	4.2.2 <i>Social and political context</i>	72
4.3	ORURO DEPARTMENT AND ORURO CITY	75
	4.3.1 <i>Political and ethnic divisions</i>	77
	4.3.2 <i>Oruro city</i>	79
	4.3.3 <i>Constraints to health and access to facilities in Oruro</i>	83
4.4	A BRIEF HISTORY OF EXCHANGE, SOCIAL IDENTITY AND MEDICINAL PLANTS IN THE CENTRAL ANDES.....	86
	4.4.1 <i>Pre-colonial development, ethnic groups and exchange in Bolivia</i>	88
	4.4.2 <i>Colonial Identity: Cities, traders and marketplaces</i>	91
	4.4.3 <i>The birth of a Republican and national identity</i>	93
	4.4.4 <i>The development of urban marketplaces and trade unions</i>	95
4.5	ETHNICITY, SOCIAL CLASS AND CONFLICT OF RITUAL PERFORMANCE BETWEEN RURAL MIGRANTS AND URBAN RESIDENTS IN ORURO CITY.....	100
	4.5.1 <i>Conflict and identity of indigenous communities and national traditions</i>	102
4.6	SUMMARY	107

Chapter 5: The Andean Medicinal Plant Market Network, Classification Systems and Distribution of Chemical Compounds

5.1	INTRODUCTION	108
5.2	ASPECTS OF MEDICINAL PLANT CLASSIFICATION AND DISTRIBUTION.....	108
	5.2.1 <i>Ecological and floral diversity in Bolivia</i>	111
	5.2.2 <i>Ecological regions and medicinal plant distribution</i>	113
	5.2.3 <i>The market regions and trade routes of Bolivia</i>	116
	5.2.4 <i>The chemical landscape and pharmaceutical resources of market regions</i>	121
5.3	ANDEAN FOLK NOMENCLATURE AND MEDICINAL PLANT CLASSIFICATION.....	123
	5.3.1 <i>Medical plant classification by specialist market stallholders</i>	129
	5.3.2 <i>The use of gender as a metaphor to classify medicinal properties</i>	135
	5.3.3 <i>The use of colour to classify medicinal properties</i>	137
	5.3.4 <i>Local and commercial contexts of medical plants classification: K'oa, Thola and Muña</i>	138
5.4	THE HIGH ANDEAN REGION: COMMON FLORA AND ENDEMIC SPECIES IN RITUAL MIXTURES.....	141
	5.4.1 <i>K'oa, Regulation of highly endemic species</i>	146
5.5	THE EASTERN INTER-ANDEAN VALLEYS: REGIONAL MEDICINAL PLANT RESOURCE REDISTRIBUTION AND COUNTERACTING MONOPOLISATION BY SUPPLIERS.....	149
	5.5.1 <i>Common herbs and commercial flora in the upper central valley</i>	151
	5.5.2 <i>Common floral mixtures, and preventing monopoly by suppliers</i>	153
	5.5.3 <i>Regulation of endemic resin and seed supply through use of mixtures</i>	155
	5.5.4 <i>Medicinal resources of the tropical lowlands and external regions</i>	158
5.6	THE IMPLICATIONS OF CLASSIFICATION USING MEDICINAL COMPOUNDS FROM PLANTS IN A CHEMICAL LANDSCAPE	159
5.7	SUMMARY	162

Chapter 6: Variation, Cultural Context and Transmission of Medicinal Plant Knowledge

6.1	INTRODUCTION: VARIATION AND REPRESENTATION OF MEDICINAL PLANT CLASSIFICATION	164
6.2	HUMORAL THEORY AND THE CONTEXT OF CLASSIFICATION IN THE MARKETPLACE	164
6.2.1	<i>Market stallholders use of hot and cold categories for selection of remedies and as an explanatory model of illness</i>	167
6.2.2	<i>Market stallholders use of hot and cold qualities for classification of plant properties.</i>	171
6.2.3	<i>The role of hot and cold categories and humoral theory for medicinal plant knowledge transmission in the marketplace.....</i>	177
6.3	INTRODUCTION TO ANDEAN MAIZE AND ETHNOMEDICINAL KNOWLEDGE TRANSMISSION. ...	181
6.3.1	<i>The cultural important and medicinal uses of maize in Oruro.</i>	184
6.3.2	<i>Folk nomenclature, classification and use of specialist maize varieties.....</i>	188
6.3.3	<i>Overview of the relevance of maize to the transmission of knowledge.</i>	199
6.4	SUMMARY.....	203

Chapter 7: Transmission and Commoditisation of Traditional Andean Medicine at the Annual *Feria* of Huari

7.1	INTRODUCTION: CONSTRUCTING THE CATEGORY OF TRADITIONAL ANDEAN MEDICINE.....	204
7.2	THE INTERNATIONAL MEDICINAL PLANT MARKET AT HUARI	205
7.2.1	<i>The identity of traditional medicine and its traders.....</i>	206
7.2.2	<i>Huari economic niches and the social system regulating trade in medicinal plants.....</i>	209
7.3	TRANSMISSION OF TRADITIONAL ANDEAN MEDICINAL KNOWLEDGE AT HUARI	215
7.3.1	<i>Trading, identity and knowledge transmission at Huari</i>	218
7.4	TRACING THE ORIGIN OF A TRADITIONAL ANDEAN MEDICINAL MARKET: HUARI FROM THE EARLY 1900S.....	224
7.4.1	<i>The recognition of traditional Andean medicine at the Annual feria of Huari.</i>	226
7.4.2	<i>1974, Santiago de Huari, a Souvenir of the International feria of Huari.....</i>	227
7.4.3	<i>1984, The construction of a traditional centre of pre-colonial exchange</i>	230
7.4.4	<i>The 2005 Feria Internacional del Janpi and local traditional knowledge</i>	231
7.4.5	<i>2006, The creation of separate 'natural' and 'indigenous' medicinal plant categories.....</i>	232
7.5	SUMMARY.....	236

Chapter 8: Cultural Identity and Variation of Andean Herbal Medicine and *Naturista* Herbal Medicine at the Annual Market of Oruro City

8.1	INTRODUCTION TO THE CULTURAL IDENTITY AND CATEGORY OF NATURAL HERBAL MEDICINE	237
8.2	THE DEVELOPMENT OF DIFFERENT CATEGORIES OF HERBAL MEDICINE AT THE ANNUAL MARKETS OF ORURO	238
8.3	NICHE MARKETS FOR MEDICINAL PLANT PRODUCTS AND IDENTITY IN ORURO	240
8.3.1	<i>The historic identity of natural medicine at the annual 'Feria del norte' of Oruro city</i>	244
8.3.2	<i>The social sectors of the marketplace</i>	246
8.3.3	<i>Andean 'Natural medicine': a niche market in the urban feria</i>	249
8.4	THE CATEGORY OF NATURAL HERBAL MEDICINE AND THE STATE INSTITUTION OF <i>NATURISTAS</i>	254
8.4.1	<i>Biomedical and Andean explanations of natural medicine</i>	257
8.4.2	<i>The shop and urban naturista</i>	261
8.4.3	<i>The itinerant naturista</i>	264
8.4.4	<i>Variation in knowledge of the Andean herbalist and the itinerant Andean naturista</i>	267
8.5	SUMMARY	269

Chapter 9: The Urban Marketplace as a Centre for Cultural Transmission

9.1	INTRODUCTION	270
9.2	REGIONAL SPECIALISATION AND KNOWLEDGE	271
9.2.1	<i>Market exchange and specialisation of market stallholders in Oruro</i>	273
9.3	THE URBAN MARKETPLACE AS AN IDENTITY AND CULTURAL CENTRE	275
9.3.1	<i>The central marketplace of Oruro city: Mercado Fermin Lopez</i>	278
9.3.2	<i>Parades and conflict between residents and migrants in medicinal plant trade</i>	282
9.3.3	<i>Cultural knowledge transmission and the fiesta cargo system</i>	285
9.3.4	<i>'Day of the Market': fiestas, internal hierarchy and cultural knowledge transmission</i>	286
9.4	THE URBAN MARKETPLACE AND LOCAL SPECIALIST KNOWLEDGE OF ANDEAN <i>MESA</i> CURES	292
9.4.1	<i>Ritual and the transmission of knowledge outside the marketplace</i>	301
9.5	SUMMARY	303

Chapter 10: Conclusions

10.1	SUMMARY	304
10.2	SIGNIFICANCE OF FINDINGS	314
10.3	FUTURE RESEARCH.....	315

11: GLOSSARY	318
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12. APPENDICES

APPENDIX 1. MEDICINAL PLANT SPECIES, COMMON NAMES, VEGETATION FORMS AND ECOLOGICAL
REGIONS.....321

APPENDIX 2. WHOLESALE DISTRIBUTION OF MEDICINAL PLANTS AT THE ANNUAL MARKETS OF ORURO
.....328

APPENDIX 3. INGREDIENTS USED OF THE *MESA NEGRA* MIXTURE332

13. BIBLIOGRAPHY333

List of tables

Table 1.	Quechua environmental zones elaborated from Vidal (1979).	114
Table 2.	Distribution of medicinal species in ecological zones.	115
Table 3.	Ecological regions of medicinal flora used in central Andean pharmacopeia.	117
Table 4.	Knowledge distribution of the folk species <i>k'oa</i> and its use for medicine and ritual.	140
Table 5.	Maize race complexes in Bolivia, following Avila and Guzman (1998).	188
Table 6.	Twenty-five named folk varieties used for healing rituals sold at the annual <i>feria</i> of maize.	189

List of figures

Figure 1.	Relief map of the of the Bolivia Republic known as ‘The Plurinational State of Bolivia’, and the location in the South American continent.	66
Figure 2.	Ethno-linguistic map of <i>Pueblos Originarios de Bolivia</i> (Indigenous people of Bolivia).	67
Figure 3.	Ecological variation, major trade routes and Andean cities of Bolivia.	69
Figure 4:	Plan of Oruro city showing residential zones, marketplaces and movement of trade, through the city.	82
Figure 5.	Market network and the ecology of market regions of Bolivia.	118
Figure 6.	Movement of produce through weekly markets in Bolivia.	120
Figure 7.	Movement of products through annual markets in Bolivia.	120
Figure 8.	Photo. Maize cob: <i>Mama sara</i> , with one ‘child’.	192
Figure 9.	Photo. Maize cob: <i>Mama sara llallagua</i> , with two ‘children’.	193
Figure 10.	Photo. Maize cob: <i>Mama sara tijra</i> , with three ‘children’.	193
Figure 11.	Photo. Maize <i>suca</i> , cob with 12 rows.	195
Figure 12.	Photo. Maize cob: <i>imanta</i> , pod corn (tunicate maize).	195
Figure 13.	Photo. Maize <i>Imanta</i> , cobs of different folk specific and botanic maize races.	195

Figure 14.	Photo. Wild maize. <i>Perla del Señor</i> .	196
Figure 15.	Photo. Detail of <i>kuti</i> maize rows of kernels facing in opposite directions.	196
Figure 16.	<i>Kuti maize negro, hembra</i> (female) above and <i>macho</i> (male) below.	197
Figure 17.	Plan of the annual <i>feria</i> of Huari, 2006.	211
Figure 18.	Plan of medicinal section, <i>feria</i> de Huari, 2006.	211
Figure 19.	Plan showing positions of traders in the Traditional Andean Medicine sector of the annual <i>feria</i> of Huari, 2006.	213
Figure 20.	The banner for the Annual fair of Huari in 1974. The text reads: Souvenir from the International Fair 1974, courtesy of the municipal major. Huari-Bolivia.	228
Figure 21.	The figure of Santiago de Huari in the Church of Huari.	229
Figure 22.	The welcome banner at the town entrance, <i>feria</i> de Huari 2005.	231
Figure 23.	Poster for the 2006 annual <i>feria</i> of Huari.	234
Figure 24.	Plan showing sections of the annual <i>Feria del Norte</i> of north Oruro city 2006.	248
Figure 25.	Plan of traders in the medicinal sector, annual <i>Feria del Norte</i> of north Oruro city, 2006.	248
Figure 26.	Don Juan and his wife at the annual <i>Feria del Norte</i> in Oruro.	266
Figure 27.	The sisters' stall at the annual <i>Feria del Norte</i> in Oruro city.	267
Figure 28.	Main entrance to Fermin Lopez marketplace.	280
Figure 29.	Western perimeter of Fermin Lopez marketplace.	281
Figure 30. A.	Stallholders from the Junin street market section parading in front of the municipal office.	
	B. Standard for the Junin street market section. 'Association of minor Commercialists, Junin street and joining roads, 12-X-87, Oruro, Bolivia'. Background colour: red, yellow and green of the national flag and the central emblem is that of Oruro.	284
Figure 31.	Figure of <i>Señor de la Paciencia</i> being carried through the Fermin Lopez Marketplace: 'Day of the Market' 2006.	289
Figure 32.	Specialists Andean medicine stallholder with <i>mesa blanca</i> , Fermin Lopez Marketplace.	295

Figure 33.	Specialist Andean medicine stallholder preparing <i>k'oa mesa</i> in Fermin Lopez market.	295
Figure 34.	Small urban <i>mesa blanca</i> .	296
Figure 35.	Medium size <i>mesa blanca</i> offering for a mine.	298

Chapter 1

Research Problem and Overview of Thesis

1.1 Introduction

This thesis explores how medicinal plant knowledge is produced, reproduced, transmitted and represented through the use of folk nomenclature, classifications, cultural beliefs and rituals in the marketplace. Medicinal plants form the basis of primary health care for the majority of people in developing countries and play an important role in the medical systems of developed countries. Increased migration from rural areas, growth in urban populations and the adoption of a market economy in underdeveloped countries has meant marketplaces have become one of the primary sources for distribution of medicinal plant material and information on their use. Yet little is known about the role of the marketplace or the vendors in knowledge transmission for the regulation, harvesting, selection, distribution and uses of plants as part of pharmacopeia and wider medical or health systems.

Research on indigenous or traditional knowledge has shown that people have an extensive knowledge of their natural environment, which they use to regulate and exploit their natural resources. Ecological knowledge, accumulated over generations, enables people to manage their environment to benefit their health through medication from a bioactive pharmacopeia, which includes diet (Johns 1996; Etkin 2000). For indigenous people, exchange forms an important part of how they access and distribute resources and knowledge about plants and their uses. The following thesis answers the question of how knowledge of medicinal plants and products is produced, represented and transmitted along market chains and between traders from different ecological regions and cultural groups, and draws on ethnographic and ethnobotanical research in the marketplaces of Oruro, in Andean Bolivia.

In this introductory chapter, I discuss both theoretical and ethnographic background material, necessary to understand the various contexts that have led to the research and the particular way it has been conducted. I describe the overarching research questions,

preview some of the findings and their significances, and present an overview of the chapters to come.

1.2 The Anthropology of Markets and Marketplaces

Anthropological studies of marketplaces consistently emphasise the social and economic roles of the marketplace and the social systems that regulate the distribution of products and information in the marketplace (Geertz 1979; Alexander 1987; Plattner 1989; Bestor 2004). The marketplace also enables us to observe the different cultural contexts and social identities products take on as they move across the market network from centres of production to locations of sale (Appadurai 1986). From his study of the Tsukiji fish market in Japan, Bestor (2004:7) defined the marketplace and its interactions as “the social and cultural context in which distribution is embedded”; where, the market is not simply an economic phenomenon but a ‘social product’ in which small-scale sectors flourish. Following Bestor’s description, the marketplace is conceived as a physical space, but its attachment to space and place through cultural processes define its identity and the relationship of its institutions. “This construction of place connects social structures to the generation of meaning, meaning in which place matters: meanings of identity, tradition, affiliation without which institutional structure would grind to a halt” (ibid: 18). In Andean marketplaces, stallholders are also dependent on the socio-cultural system to define their identity against other participants or traders and to ensure they have a reliable supply of plant material.

Anthropologists, and others, often report transition to a market economy and market exchange as the cause of over exploitation of resources and distribution of unregulated and potentially dangerous or ineffective medicine. Yet in the Andes exchange and markets have always operated as a means of redistribution of resources and knowledge, and form the infrastructural basis of a traditional health system. For example, the annual market and the permanent central marketplaces of Oruro city, Bolivia, are specialist centres that distribute over four hundred different medicinal plant species and complex mixtures from the diversity of environments that form the southern central Andean corridor. The annual market held in the town of Huari, 130km from Oruro city, is the largest market for the exchange of plant material used in traditional Andean medicine in the southern Andes. The central marketplace of Oruro city, the Mercado

Fermin Lopez, distributes the traditional *mesa* mixtures and their ingredients, across Bolivia, for the cure and prevention of illnesses described using an Andean medical explanatory model of causes. The annual market held in the northern suburb of Oruro city, the *Feria del Norte*, distributes fresh plant material from the eastern valley and mixtures used in Andean natural medicine for illness with biological causes. In all of these locations, the market stallholders use Andean ethnomedical terms to classify the plant material and medicine, and this knowledge is critically important and defines the function of the marketplace as a distributor of resources and knowledge.

In Bolivia, studies of medicinal plant knowledge and markets have identified how medicinal knowledge itself is used as a commodity with social and political implications (Crandon-Malamud 1991). By considering the marketplace as a cultural centre and institution, this study seeks to show how the marketplace interacts with other social institutions, particularly the types of knowledge and social mechanisms used to transmit and regulate cultural knowledge and identity that results from the use of, and exchange of, medicinal plants and the medicinal products produced in the marketplace.

1.3 Market ethnobotany and health

Studies of ethnobiology and ‘indigenous’ plant knowledge have shown that integration into market systems and monetary exchange can lead to loss of local knowledge (Reyes-García et al. 2005). However, market systems and exchange can also produce competition and local specialisation (Nash 1966; Nash 1993) that create new forms of knowledge. Thus, Bestor (2004: 18) describes the authenticity of a place and as such a marketplace, ‘as a locus of action and identity’, not one of ‘isolation and insularity’ but ‘the product of and mechanism for articulating larger spheres of social and cultural relationships’. The social and economic functions of folk, indigenous or traditional knowledge transmission in the context of rural communities are well known, but little is known of their transmission in marketplaces or the role marketplaces play to integrate multiple sets of localised knowledge into a wider exchange network and knowledge system. By comparing the structure and distribution of knowledge in communities located at the end of market chains with those that are central to exchange networks, ethnobiological theory can expand to include the role of the marketplace in producing localised specialist knowledge, and as a mechanism for articulating wider spheres of

exchange for the transmission of cultural knowledge. This study addresses these issues, contributing to theory in the fields of ethnobiology, indigenous and traditional knowledge transmission, medical anthropology, ecological anthropology and Andean studies, and it will also be of interest and importance to policy makers concerned with health and natural resource conservation.

Health practices and medicinal plant knowledge serve multiple functions in response to socioeconomic circumstances that include identity maintenance, acculturation, economic levelling, resource redistribution and maintenance of socio-cultural systems as well as other group regulating processes (Press 1978). The medicinal properties of plants are used for the prevention and cure of illness that include their use in peoples diet, although the perception of a plant as efficacious is embedded in cultural context (Whyte and Van der Geest 1988; Etkin 1993 and 1996). A viable epistemology or health system using plants includes knowledge of the interaction between disease, health and ecology, specifically the selection and combination of plants for prevention and treatment of different illnesses. A health system would also need to incorporate social and economic mechanisms for the regulation of exchange, distribution, quality of source material and pharmacological stock, to maintain a diverse and efficacious pharmacopeia. Few studies, however, have observed how these other forms of knowledge are produced, represented or transmitted in the marketplace or along market chains.

The marketplace often features in ethnobotanical and ethnomedical literature as a rich source of data on traditional and indigenous medicinal plant knowledge (Martin 1995; Bye and Linares 1983; Cunningham 2001; Hersch-Martínez 1995), while the stallholders are used as authorities to confirm the consensus of general knowledge for the 'correct' plant name or use (see Bussmann et al. 2007, for a recent example in the Andes). Whilst studies cite the marketplace as a source of knowledge about plants and their uses, stallholders are typically linked to a specific cultural, ethnic or social group or to specialist healers. No distinction is made between the knowledge system used by market traders and those of their own socio-cultural groups, nor that of the other local groups that the buyers and sellers are drawn from. By linking market stallholders to rural knowledge systems with communal based knowledge transmission and specialist

healers, traders and marketplaces are not recognised as having independent knowledge. A knowledge formed in the marketplace, that may include a distinct classification system for plants and natural medicine formed from the practical knowledge that enables substitutions for plants and can incorporate new knowledge of plants and illness which is then distributed out to and interacts with rural communal knowledge systems.

Studies of marketplaces have focused on the quantity of plants traded (see: Hersch-Martínez 1995 and 1997) and not always on the social systems that regulate the use, exchange and exploitation of these plant resources. Such studies overlook the complex socially-regulated community of the marketplace, the ‘apprenticeship’ learning process, specialisations and hierarchy within the marketplace, and the regional and socio-cultural variations of all of these aspects. On closer inspection, the marketplace provides a unique site to study cross-cultural knowledge transmission in the domain of medicinal plants, including how the domain is classified, categorised and interpreted by different groups. A trader’s social network links a vast ecological and cultural matrix into an Andean medicinal plant knowledge system that serves multiple centres of production and consumption.

Rivera Cusicanqui’s (2005) study of the trade and use of coca leaf (*Erythroxylum coca*) in Argentina demonstrates how commoditisation of social and national identity combined with multiple uses and the development of biomedical products affects the classification and social identities of coca and the consumption patterns of different groups. The coca leaf is known to have medicinal properties to help with digestion and altitude sickness when chewed or taken as a tea, and to counteract tiredness and hunger when chewed with ash. It is also used to produce cocaine associated with high end western drug consumption. In Argentina, the recent legalisation of the coca leaf has led to the practice of coca leaf chewing by both lower and upper classes. Lower classes in marketplaces select leaves from the traditional coca sacks and sit around exchanging leaves and chewing with ash in the tradition of *pijhar*. Upper classes would traditionally not *pijhar* but take the coca tea bought in shops in tea bags. A new trend for connoisseur coca leaf chewing of selected leaves bought from specialised outlets, in coffee bars, pool halls and clubs has become a sign of modern western identity and social status.

Each form of use for the plant, as medicine, socially and as a drug, forms a social context for the plant. In Bolivia, the form of consumption has become associated with social class and ethnicity. Where consumption is legal, the chewing of leaves is associated with the social class of *indio* or peasant and is used for its properties to treat hunger and tiredness. The coca leaves used in tea are associated with the upper social classes and the medicinal properties used for digestive and altitude sickness. Although both groups use the coca leaf for the same medicinal properties it also has distinct social connotations dependent on the form and context in which it is consumed.

1.4 Ethnobiological knowledge systems

Ethnobiology and ethnobotanical studies of knowledge have moved away from just compiling lists of local plant names and their uses, and now also seek to better understand the dynamics of knowledge systems, and their role in ongoing and often complex interrelationships between humans and their environment. Cross cultural studies in ethnobiology have shown the importance of both lexical and non-lexical (or non-verbal) forms of knowledge, and that knowledge is emergent, processual, and contingent and so can only be fully understood in its cultural context (Ellen and Harris 2000). Studies have also found knowledge is not evenly distributed within groups, and specialisation creates experts who use different classification systems and have access to knowledge others do not. To address variation in knowledge between specialists and non-specialists, or among any set of social groups, therefore requires recording both the actual knowledge in its lexical forms and the cultural mechanisms used to represent, transmit and contextualise this and non-lexical knowledge. For example, Andean people use colours, shapes, myths and symbols to transmit knowledge of many domains, not just plants. Dransart's (2002) study of weavers in the Aymara communities of Isluga, Chile, demonstrates how the use of a colour needs to be understood in the specific cultural context it is used, and how representations are learned through practice. She describes how myths are used to relate colour to meaning and how the same colour can have different meanings in different places, for different uses of textiles, and for different generations. Dransart (2002: 75), following Ellen's argument (1979:19), considers changes in weaving of textiles as suggestive of the view that there is no all-embracing, undifferentiated worldview integrated through symbolic classification in Isluga, but rather only representations. This thesis presents a similar

type of analysis of medicinal plants and their dynamic representation as they travel through marketplaces across the Andes.

The development of cultural strategies of ‘learned knowledge’ and ‘practices’ are required to regulate the dynamic relationship between local specialist knowledge for production of plant medicines, health and access to resources from exchange networks. The success of this cultural strategy can be defined and measured by the quality, quantity, diversity and distribution of the medicinal plant pharmacopoeia, without over-exploitation of natural resources and the adoption of cultural mechanisms used to regulate these factors. While ethnobotany and ethnopharmacy have recorded extensive lists of plants used as simples (individual plants) to cure illness, little is known of how plants from multiple environmental regions are selected for trade, classified as folk medicine, and combined as mixtures, or used for the prevention of illness and regulation of disease vectors within and between populations as part of a wider or holistic health system. Ritual and social systems are multi-functional and serve to transmit knowledge between specialists, non-specialists and along market chains between consumer and producer who may not meet or be directly connected. By studying the social and cultural mechanisms used for knowledge transmission in the marketplace it is possible to trace how knowledge of the selection, combination and use of different plants for medicinal purposes is encoded, represented, transmitted and interpreted in the marketplace by different cultural, linguistic and specialist groups of producers and users.

1.5 Research Questions

Given this theoretical context, which is described in greater depth in Chapter 2, fieldwork was designed and conducted to answer five broad questions:

- 1) How are social mechanisms for transmission, regulation and reproduction of cultural knowledge and practices incorporated into the marketplace?
- 2) What roles do Andean social mechanisms and institutions play in medicinal plant knowledge transmission in the marketplace of Oruro?
- 3) How do market traders use Andean social-economic systems of exchange to regulate quality and diversity of the medicinal plant pharmacopeia found in Bolivia?
- 4) How is the diversity of the medicinal plant pharmacopeia located across the multiple ecological regions found in Bolivia distributed through the market system?
- 5) Does cultural identity influence and create local knowledge in each marketplace?

To preview the findings and conclusions of this thesis, I argue that each marketplace in Oruro needs to be considered as a cultural centre that produces a local form of specialist knowledge. I propose that this knowledge is a result of, and formed from, the local ecological, social and historic context of the marketplace and its traders. Within each marketplace traders use these cultural identities as social and cultural mechanisms to regulate the production and transmission of medicinal plant knowledge, and the internal hierarchy between traders. Local knowledge, classification and the effects of commoditisation and market economies on knowledge transmission, raise several problems and questions that are the basis of the thesis to follow.

In the following sections of this chapter, I describe ethnographic background of the study site and Bolivia's markets, briefly introduce the fieldwork itself by describing some of the issues when working in marketplaces, discuss the wider significances of the research and briefly outline the chapters to come.

1.6 Ethnographic background: Medicinal Plant Knowledge and Exchange in the Bolivian Andes

Bolivia's current territory extends across the central Andes and tropical lowlands. Bolivia has a rich cultural history and high biodiversity with many endemic species. Cultural adaptation to the highly varied environments found in Bolivia has led to multiple ethnic groups with localised specialisations linked via exchange systems, which are well documented (Murra 1995; Buechler 1983), and includes specialist medicinal plant knowledge (Bastien 1985 and 1987b) dating to pre Columbian (1532) and pre Inca (1100) periods. Recent and widespread changes in population (involving migration and urbanization), land tenure systems, and work relationships have profoundly affected exchange systems (Buechler 1983), yet marketplace trade continues to incorporate many of the traditional socio-economic institutions and patterns found in rural communities. Andean ritual traditions and beliefs about health also continue to persist as explanatory models of social, ecological and human interactions in both rural and urban areas. The social mechanisms used to regulate the trade of medicinal plants in the informal market system form an important part of Andean knowledge about the distribution of medicinal plant resources, environmental exploitation and its interrelation with the health of the population.

The diverse pharmacopoeia found in current Andean communities combines local resources with products acquired through exchange. Communities in rural areas and in the country's main cities use an extensive pharmacopoeia of over one hundred medicinal plants, animal products and minerals sourced from the diverse ecological regions of Bolivia and through international trade routes, to cure a range of naturally and socially-defined illnesses (for examples in Oruro see: Alba 1987; Macía et al 2005; Sikkink 2010; Wilkin 2004 and 2008). Andean communities have developed an extensive knowledge of both the pharmaceutical properties of plants and the relationship between human use of natural resources and environmental health (Bastien 1978). Further, communities have developed complex classification systems and social mechanisms to regulate plant distribution and selection for resistance to disease and genetic diversity (Johns 1996), and to represent their relationship to human health (Bastien 1978).

Over a thousand plant species have been recorded as used for medicinal purposes by ethnic groups in Bolivia, though inventories of market places in La Paz (Macía et al 2005), Cochabamaba (Sikkink 2010), and Oruro (this study), all record some 200 species which form the basis of the pharmacopeia found in marketplaces and used in the Andean health system. While the specific species vary from one market to another there appears to be a basic set of plants that can be found in all marketplaces. Medicinal plant traders form a specialist group with a unique knowledge of the source, supply, distribution, classification, quality and use of the plants that make up the central Andean pharmacopeia.

The research for this thesis was conducted in the department of Oruro, located centrally on the Andean plateau in south western Bolivia. The departmental capital of Oruro, Oruro city, is located centrally on the trade routes of the southern Andes, and at a crossroads between the routes which link the Pacific coast with the eastern lowlands and humid northern Andean environment with the dry southern region. Oruro city has a multicultural population of over 340,000 people with Quechua, Aymara and Spanish speakers. The marketplaces in Oruro provide the pivotal centre of exchange for medicinal plant products between these regions and the different linguistic and cultural groups found there. Studies of traditional medicinal plant knowledge in rural communities surrounding Oruro city (Marca 1997), and my own studies in Oruro department and city, recorded that the marketplace was the principal mechanism for distribution and sourcing of medicinal plants and knowledge about their use. It follows that the marketplace stallholders have an extensive knowledge of the plants, their uses and the systems needed to regulate and maintain the redistribution of these resources.

The Bolivian State, international conservation groups and health organisations have all recognised the importance of medicinal plants for treating disease and as a commodity for the pharmaceutical industry, indigenous knowledge and conservation. But, along with medical institutions, conservationists and economists, they criticise the ‘unregulated’, ‘open’ medicinal plant marketplace. Driven by the conservation discourse, market traders and medicinal plant products sold there, are considered to be an unregulated and inefficient system that exploits natural resources and offers unreliable and poor quality medical products for consumers by the state. The regulation

of medicinal plant products for commercialisation in Bolivia has created distinct categories of medical plant products and the types of knowledge they are associated with. These views have resulted in a conflict of interest between market stallholders' traditional knowledge, and the emerging specialist groups of 'natural' and 'traditional' healers with political representation, who are vying for power, regulations and restrictions as to who can trade what and where, who holds indigenous status and in turn has traditional knowledge in Bolivia.

In 1987 Bolivia recognised 'indigenous' medicinal plant knowledge and traditional medicine as an integral and important resource for the national health system. A Presidential Decree in 1987 created the Institute of Kallawaya Traditional Medicine (*Instituto Boliviano de Medicina Tradicional Kallawaya*) to support, organise and coordinate research into Kallawaya medicinal plants (Kokoska and Cusimmamani 2008). National recognition and state policy to further regulate and integrate traditional healers has created an ongoing discussion between different groups of self-appointed healers, who consider themselves custodians of 'traditional' and 'natural' medicinal knowledge. In this context, 'indigenous' and 'ethnic' groups seek political representation and recognition as 'traditional' and thus act as the authentic source or authority on medicinal plants, and in doing so lay claim to aspects of medicinal plant knowledge. This process has been accompanied by a debate on the defining of criteria and the boundaries of 'Traditional' medicinal plant knowledge in Bolivia. The development of groups and categories of medical 'doctors', 'natural' healers and 'traditional' healers with sub-categories of specialists has been accompanied by state regulations for the authorisation and registration of medicinal plant products for sale in commercial areas. However, the national policy does not recognise medicinal plant traders or market stallholders as having a distinct form of specialist knowledge in relation to the supplying, sourcing or preparation of medicinal products using plants. In turn medicinal plant market stallholders define themselves as traders and are affiliated to market trade unions and not to rural based communal medical healers or their trade unions. This enables both political representation and institutional autonomy to regulate their products.

To understand the flow of information and knowledge in the marketplace it is necessary to have a clear picture of who the different actors are, what they do, where and when

they do these things, a description of the “physical setting and the rhythms of activity”, when things happen within the marketplace (Bestor 2004: 51). The marketplace is also a space in which the traders need to adhere to and conform to legal as well as social regulations. In Oruro, these include municipal regulations as to where and what can be traded, membership of marketplace unions and registration as medicinal plant traders with the government. Traders are also obliged to participate in market unions and the civil-religious institutions, which include fiesta sponsorship for the annual ‘day of the marketplace’, the celebration for the market’s patron saint. The role of these institutions and events need to be recorded and incorporated into the model for marketplaces in Oruro in order to fully understand the form and channels for the transmission of knowledge.

In Bolivia people recognise three categories of medicine: traditional Andean medicine distributed in marketplaces, the category of natural medicine distributed in shops and by registered producers, and the category of pharmaceutical medicine distributed in a registered pharmacy. Traditional Andean medicine is associated with the Andean practice of ritual offerings with mixtures of plants known as *mesa* and the use of plants for the prevention and cure of illness using Andean forms of illness classification and treatment which do not align comfortably in western medicinal categories. This knowledge is associated with rural indigenous communities and considered to be gained through an apprenticeship in the rural communities. Natural medicine is represented by fresh or dry mixtures of plants presented in labelled packages, using western botanic classification of species and biomedical illness descriptions and classifications. Natural healers are trained in basic medicine and physiology, and along with the producers of natural medicinal products, need to be registered with the state the authority who classify plants, regulate production and define efficacy based on scientific research of the properties of individual species. Pharmaceutical medicine manufacture is regulated by the state and prescribed by registered doctors and pharmacists with a degree qualification in medicine.

The marketplace forms a point of transition for products from one socio-cultural setting to another. In Oruro city’s marketplaces different forms of medicinal plant knowledge are described using categories of ‘traditional’, ‘indigenous’, ‘natural’, ‘popular’, ‘home

remedies', 'ritual' and 'magic'. Traders and specialist healers are referred to as herbalists, *Naturistas* or specialist ritual healers. Interpretations of these labels and their meanings vary between different groups and their interest in relation to wider social and economic settings outside the marketplace. Stalls selling 'medicinal' plants and mixtures in the enclosed central marketplace *Mercado Fermin Lopez* (Fermin Lopez Market) of Oruro city are referred to by the municipal department as the *Sección de Remedios Caseros* (Home Remedies Section) of the market. This complies with the economic status of the marketplaces and informal traders of unregistered products or plants used for common illnesses in the home. Medical doctors refer to these same sellers as *Kapachaqueras*, a term associated with women from rural communities who sell multiple dried plant parts and resins to cure common illnesses, and who prepare herbal mixtures and Andean remedies and offerings used for ritual purposes known as *mesa*. However, the traders who sell at the central marketplace, the Fermin Lopez Market, are men as well as women and describe themselves not as *kapachaquera* but as 'specialists in traditional Andean medicine'. They define their trade as the preparation of mixtures and sale of products for the *mesa*, and associated objects used for traditional Andean healing and as offerings to the *Pachamama* (Mother Earth). These traders recommend customers looking for 'home remedies', such as herbs to cure a cough or stomach ache, to visit the *kapachaqueras* in the lower open *Calle Junin* (Junin Street) marketplace where the peasants sit to sell fresh herbs. Stallholders of the central marketplace define themselves as a social group whose culture is centred in the marketplace and city through participation in rituals and traditions performed in the city and in the marketplace. They contrast themselves with the open street market, Calle Junin market, located in the outer sector of the city, and with the identity and knowledge associated with the rural 'peasant' who sells there.

In Bolivia marketplace traders specialise in products, forming sections within the marketplace. Each product section has a union and more established sections have a patron saint. In Oruro the central marketplace, the Fermin Lopez Market, has a section for home remedies that sells traditional medicinal plants with a market union and a patron saint. Like coca leaf, medicinal plants are also embedded in wider processes that define peoples' identity and have both symbolic and social connotations. The multiple forms and corresponding medicinal uses of plants as pharmaceutical products reflect social identities and cultural constructions of their efficacy for local and external

groups. In Oruro, medicinal plant remedies are categorised as ritual *mesa* associated with Andean offerings by local and external groups, and herbal remedies of fresh herbs used internally or externally using western bio-medical or humoral explanatory models. Understanding how these explanatory models are linked to empirical knowledge of plant use requires locating them in their wider social context. The multiple medicinal properties and forms of use for plants in Andean healing create significant overlap between folk medicinal use categories of Andean *mesas* and natural medicine, and western categories of medicine and ritual. The *mesa* cures are used for psychosomatic illness, control of vectors of disease, prevention of illness, regulation of resource distribution and as cures for illness. Also, the *mesa* are typically classified and studied for their non biological properties.

The social and economic mechanisms or systems used to regulate exchange, distribution of resources and transmission of cultural norms in highland Bolivian communities are based on a hierarchical system of *cargos* or roles of authority and the performance of rituals (see Rist 2002, and Astvaldsson 2002 for examples). In the *cargo* system members take on positions of authority in the community that involve the participation and performance of rituals and fulfilment of roles as sponsors (*pasante*) of ritual *fiesta*. In completing each role the *pasante* learns through participation and gains ritual experience and knowledge, as well as experience of developing a social network to access resources and loan goods for the *fiesta*. The successful fulfilment of each role in the hierarchy requires preparation in the correct way to perform rituals and enables the reproduction of cultural practices and transmission of ‘ritual rules’ (Buechler 1970). The accumulation of cultural knowledge by community members, provides participants with what can be described as ‘ritual capital’, following Bourdieu’s (1984) description of knowledge as capital. The system of *pasante* is also used in marketplaces and provides a key to understanding the process of reproduction and transmission of medicinal plant knowledge in the marketplaces of Oruro.

1.7 Fieldwork in Markets

The medicinal plant marketplaces of Oruro city are continually changing, often chaotic places, with people constantly coming and going. This dynamic nature of the market place is reflected in the diversity of people and products. People speak multiple languages and have different cultural backgrounds, while products are from multiple

ecological regions. Transactions are carried out in silence or with shouting and elaborate public displays. Some stock is piled on display while other products may be hidden in bags and out of view. Stallholders manage a dynamic inventory and assortments of plants and plant parts that change throughout the day and with the seasons as new material is bought, sold and exchanged. Plants are often mixed together or combined with minerals and animal parts in processed preparations and mixtures. A single transaction can expand in time and space and could include multiple products or purveyors. Stallholders develop a specialist and 'practical' knowledge of the availability, use, selection and substitution of plants that is a direct result of their work and access to knowledge from buyers and suppliers. Medicinal plant market stallholders do not fit comfortably into academic social categories for medicinal knowledge of rural and indigenous or modern and urban, or a socio-economic category of upper, middle or lower class, or into clear ethnic groups, but draw on aspects of each of these and form a distinct specialist group in themselves.

What attracted me to the marketplace as a field site was its position compared with the usual or 'traditional' sites of ethnobiological, ethnobotanical and medical anthropology studies. Typically, such studies are limited by geographically defined cultural communities and focus on knowledge variation within a group that shares a common language, location and flora. Marketplaces, as described above, are multicultural communities, crossroads and meeting grounds for a variety of people and products from a diversity of ecological and cultural origins. They therefore present very different problems with regard to research, but also in terms of the social and cultural processes that can be observed there.

To understand how medicinal plant knowledge is encoded as categories (natural, traditional and ritual) I begin by providing a description of my own experience in searching for information in the marketplace. This example highlights how the social identity of a trader, patient or researcher can define knowledge transmission. From the moment I began fieldwork I was constantly defining my identity against preconceived constructions of foreigner, tourist, scientist or botanist, client, and that of specialist healer to try to gain more information from informants than I was supplying. It is this constant barter and exchange of information that characterises marketplace interactions

and the role of marketplaces in knowledge transmission. Rather than try to obtain a neutral identity it became more important to understand how I could construct these identities and how they transformed and changed the type of information I was able to access. I began my research with participant observation, performing the role of a member of the general public in the central marketplace of Oruro. Stall owners eagerly called out for my attention and trade, offering love potions and lucky charms to protect me from illness and accidents in my travels. I had been categorised as a foreign tourist, with an interest in the exotic, a high economic potential with a limited ongoing commitment to a sale or likely to request refunds for products not living up to their reputations.

For my next visit I prepared my notepad, plant collection equipment, voice recorder, camera, assistant for translation and other necessary paraphernalia to engage in an authentic ethnobotanical study. On returning to the central market, my initial search for information was met with consideration, while I explained the aim of my study to one seller. She replied: ‘This is what the students do to build up a botanic collection for their fourth year science project at school. For each plant you buy I will tell you the names and uses, you will write them down in your book’. Market trader Oruro 2006.

Enquires with other traders at the marketplace followed a similar line. I was conducting an ethnobotanical study which required the collection of voucher specimens to identify plants being sold in the marketplace. I was still classified as foreign, with limited ongoing or long-term commitment and not likely to reclaim efficacy of the medicine. This exchange revealed preconceived notions of the context of medicinal plants in biomedical terms by listing individual plant species and their corresponding properties. I learnt nothing of why a plant was or was not efficacious or how plants should be combined in mixtures. These two visits demonstrated medical pluralism and stallholders use of multiple medicinal explanatory models, folk classification criteria or folk categories of medicine. My continued visits, now without an assistant, and purchases for real and imagined illnesses allowed me to gain a level of acceptance and status of client with the traders in Oruro City’s two central marketplaces, the Fermin Lopez and the more recently established open marketplace held in Calle Junin. Through continued purchases I became a *casero*, a regular ‘client’ with an ongoing set of social and economic relationships. Comparing different plant names and how

properties varied when plants were used in mixtures I was able to develop an ongoing knowledge of uses, origin and availability of plants that I could use to barter for knowledge with traders and to develop basic terms used for local folk classifications and categories of plants, medicine and illness.

My continued presence in the marketplace and increasing knowledge led to a further re-classification of my identity; from *casero* client to ‘specialist natural’ healer’. This change, rather hard-earned and thus gratifying, was due to my new ability to recognise plants and provide their names and uses, along with being a regular client in the market and at annual markets in rural areas. This higher status, achieved after nearly two years of visiting markets and annual *feria*, cataloguing and memorising multiple plant names, uses and forms of folk classification, enabled me to discuss with traders their knowledge of regional and cultural variation in plant names and mixtures. I was able to discuss the different criteria used for including plants in mixtures, variation in mixture ingredients, when and why these should be used, and by whom. The mixtures were no longer a simple list of ingredients used time after time. Rather, they turned out to be much more dynamic, varying in composition depending on the marketplace, the client and the expected use. Part of this dynamic was in fact due to the multiple classification systems that related these mixtures to plants, illnesses and social groups. The selection of plants, substitutions and combinations formed a distinct body of knowledge, which was held by the traders, about how plant’s pharmacological properties and compounds are altered when used individually or in combination. By accompanying traders to annual marketplaces I was able to document how they used Andean socio economic systems that value the combination of plants from multiple ecological regions and set rules for combining plants, to verify the efficacy of their products.

My access to knowledge about traditional Andean Medicine and *mesa* ‘mixtures’ beyond lists of ingredients, took more diverse paths. These began with regular purchases of *mesa* and traders’ explanations of when, where and how to use them. This basic common knowledge led to learning the ‘practical’ form of their use, and the relationship of different ingredients within the context of the Andean explanatory model of plant properties. A comparison of traders’ knowledge and practices—why one trader would add particular ingredients to mixtures, while another would not—clarified not only whose knowledge was correct, but why it was correct at different times for

different people. Learning cultural norms of the marketplace, such as the etiquette of a client and trader, where it is customary to offer coca leaves and sit, and ‘chew leaves together’, *acullicar*, provided another context for understanding medicinal plant knowledge. A good *mesa* takes time to prepare, unlike an ‘off-the-shelf’ standard mixture. Ingredients are added and taken away to meet the client’s needs; the inclusion of each ingredient is carefully explained. Sitting and waiting for a *mesa* to be prepared could take hours, but this created a setting for cultural transmission through metaphors that contextualise ingredients shape, colour, form and quantity to Andean concepts and symbolism that define Andean folk classifications.¹

Being offered the stool to sit on and chat while waiting for a *mesa* was a sign of confidence, and an invitation to trade knowledge and retell stories, the key to a successful trader and the process or practice of cultural knowledge transmission. Sitting on the stool, I learnt the stories, meanings and significance of individual ingredients shapes and colours in exchange for stories of my trips to *feria*, ‘gossip’ from the city, the other markets and clients, and information on what was being sold where, and for how much. It was not until I was invited to attend private rituals of *mesa* offerings, to ask for good sales with a stallholder, that the specialist knowledge of the preparation and forms of the mixture could take their context as an offering in relation to wider aspects of life, and not only their order in the preparation. These experiences linked the plants to a wider cultural context that is not easily explained but embedded in Andean life, practices and cultural values. By establishing social relationships with traders, loyalty to their stalls and my discretion, I gained access to the public and private ritual performances that defined the social structure of the marketplace and the pathways and context of medicinal plant knowledge transmission.

1.8 Significance and summary

This thesis takes its theoretical orientation from ethnobiology, ethnomedicine and economic studies of marketplaces and commodities. Ethnobiology has recently focused on how the empirical knowledge and cultural systems used for the selection and use of plants and other organisms are transmitted, often because of fears that valuable traditional knowledge is being lost, but more importantly because knowledge studies in

¹ For an example of folk classification, symbolism and knowledge transmission of colour in central Andes see Dransart 2002.

anthropology have come to accept that much knowledge is processual, emergent and contingent (Marchand 2010). Medical anthropology's concern with how different cultures understand, interpret, encode and contextualise their medicinal experiences with plants, is also addressed as key to understanding the dynamics of transmission in the multicultural contexts of marketplaces. This thesis thus explores how ethnobiological and medicinal knowledge of plants, and their uses for the prevention and cure of illness, emerges in the course of market transactions, and is then transmitted using the socio-cultural systems of the marketplace. One of the key theoretical contributions is an explanation of the central role the specialist traders play in knowledge transmission as well as the regulation of the distribution and exchange of endemic and local species.

Understanding how medicinal plant knowledge is transmitted between and within groups, who form complex exchange networks, is important for understanding how different forms of knowledge about plants are used to influence health. The marketplace is central to the exchange and distribution of both plant material and information on plant uses between different medical systems as well as social or ethnic groups. This study also identifies issues surrounding how social beliefs influence people's use of plants in different health systems and the categorisation or adoption and transmission of different forms of knowledge. The findings are relevant to public health and environmental policies and programmes that seek to integrate traditional or alternative knowledge of plant use, selection and distribution through market networks in culturally appropriate contexts.

1.9 Thesis overview and outline

Chapter 2 reviews literature of ethnobiological knowledge transmission, commoditisation and ethnomedicine in relation to the thesis.

Chapter 3 provides a description of the methodology, problems raised and methods I used to collect data in marketplaces.

Chapter 4 provides an outline of the ecological, social and cultural context of the field site. This is an introduction to the social groups and institutions in Oruro and how they

use their history and ethnicity to justify claims to different forms of ‘traditional Andean’ knowledge.

Chapter 5 describes the Bolivian ecology as a chemical landscape by outlining the distribution of chemical compounds that result from ecological conditions and the distribution of those compounds across the market regions of Bolivia. The chapter goes on to analyse folk classification for plants, characteristics used to select plants for trade and how substitution of plant species with common properties can be made between market regions. The chapter concludes with how cultural systems can ensure pharmacopeia and herbal mixtures use flora from multiple regions.

Chapter 6 explores how specialist knowledge of the pharmaceutical properties of plants are transmitted in the marketplace between specialists and non-specialists, and between producers and consumers, using commonly held Andean beliefs and medicinal explanatory models. The case of humoral classification is used to examine variation in folk classification of plant species medicinal properties when used individually and when used in mixtures. Knowledge transmission along the market chain, between lowland farmers and specialist stallholders in the highland, is examined with the case of maize varieties selected for the ritual mixture *mesa negra*, that is used to heal debilitating illness of a non-descript origin. The section concludes with an analysis of how common cultural values are used to transmit knowledge of indirect and secondary medicinal benefits or phytonutritional properties of maize between consumers and producers located in different biocultural regions.

Chapter 7 explores how the identity of traditional medicine is constructed in the annual market held in the rural town of Huari outside Oruro city. Analysis of the social mechanisms and cultural systems used by traders at the *feria* reveals how traditional Andean medicine and mixtures sold at Huari are regulated by *Tata Santiago* who is both the patron saint of Huari and the Andean deity for healing. This provides a basis for exploring how specialist medicinal plant knowledge of mixtures known as *mesa* are transmitted.

Chapter 8 describes the annual market held in the northern suburb of Oruro city and how the category of Traditional Andean Herbal Medicine is related to the history and

location of the marketplace. The medicinal plant mixtures sold at the annual market of Oruro city provide a case to analyse variations between biomedical and Andean forms of classification, and criteria for selection and combination of plants in herbal medicinal mixtures.

Chapter 9 begins with an introduction to local specialisations and the importance of central marketplaces for medicinal plant knowledge in Oruro. The chapter goes on to describe how different forms of cultural knowledge relating to Oruro city and the rural area are appropriated and transmitted using Andean rituals and the *fiesta* system. The chapter describes how stallholders in the city's central marketplace combine membership of market unions, sponsorship of annual *fiestas* and ritual offerings, to regulate knowledge transmission and social hierarchy within the marketplace.

Chapter 10 provides a summary of the findings in the context of the research questions and wider literature.

Chapter 2

Theoretical Orientation

2.1 Introduction

This chapter provides the theoretical orientation to medicinal plant knowledge transmission and commoditisation. The chapter is formed of three sections that review theory of firstly, ethnobiology and its sub field of ethnobotany; secondly medical anthropology and the fields of ethnomedicine and ethnopharmacology, and thirdly economic anthropology. The first section looks at ethnobiological theory and draws on studies in ethnoecology and ethnobotany to outline different forms of knowledge, their representation, transmission and distribution. This is followed by an analysis of the role of folk classification in knowledge transmission. The second section draws on examples that demonstrate aspects of cross cultural classification of medicine, medical pluralism and the need to acknowledge plants' biological properties using examples from ethnopharmacology. The final section uses examples from studies in economic anthropology of marketplaces and commodity chains to identify theories of the role of social institutions and retailer's identity in the process of transmission and commoditisation of medicinal plant knowledge, with particular reference to the Andes. The chapter is summarised with theoretical and methodological considerations for the study of transmission of medicinal plant knowledge in marketplaces.

2.2 Ethnobiological Knowledge Systems

How different people classify and label objects and their relationship with the world around them has been a fundamental question in anthropology. Ellen (2006:17) defines ethnobiology as 'the study of how people of all, and of any, cultural tradition interpret, conceptualize, represent, cope with, utilize, and generally manage their knowledge of those domains of environmental experience which encompass living organisms.' This definition avoids the problems of locating knowledge in a bounded social category of 'local' place, 'folk' or 'indigenous' people or certain 'traditional' historic cultural practice, thus enabling its more dynamic aspects of practice and interaction between its different forms and how these are constructed in different places and times. Ellen (2006) identifies what he describes as two phases in the development of the discipline and theory of Ethnobiology. The first phase is based on utilitarian interest in biota for

economic value and use, such as studies of plants used for the development of pharmaceuticals. The second phase returns to principles of understanding the way people interpret the world, often referred to as folk science and ‘emic’ understanding or interpretation, and thus studies in this phase have been pre-occupied with folk classifications of natural domains such as plants.

2.2.1 Folk Classification

In his doctoral dissertation ‘The relation of Hanunóo culture to the plant world’, Conklin (1954) recorded how Hanunóo ethnobotanical knowledge, including folk taxonomy, was in fact an important cultural domain that was represented in language, and thus initiated an important and productive phase of ethnobiological research on the cognitive aspects of human-environment relationships. Since then, ethnobiological studies of folk classification have been influenced by two overarching theories: the universal theory proposed by Berlin (1992), where all classification systems are of a similar hierarchical taxonomic structure, and a more relativist theory that allows for plural or multiple classification structures and classificatory criteria, including plants being classified according to the context of their use (Ellen 2006; Hunn and French 2000). A critique of the universal theory is that variation between individuals, although recognised as a problem, has not been integrated as part of the theory and structure of classification systems (Ellen 1993: 126).

In Berlin, Breedlove and Raven’s 1973 publication of their work among the Tzeltal Maya, they announced the ‘General principles of classification and nomenclature in folk biology’. Berlin et al. argued that the universal organising structure of folk classification is hierarchic and formed of mutually exclusive taxa which follow a taxonomic principle of inclusion, where taxa from one level or rank are subsumed by the higher level or rank. Berlin argues that ethnobiological classification systems are primarily based on morphological characteristics (size, shape, colour, texture), behaviour, habitat and to some extent human use. Following Berlin, for all plants that have a use, including medicinal, we require also a *special purpose* classification, that is how specific properties pertain to specific purposes of the plant’s use and not simply the universal ability of humans to group objects together based on morphology.

The acceptance of the above approach led to ethnobotanical, ethnomedical and ethnopharmaceutical studies producing lists of localised names for plants with the assumption of the correlation between botanical and biomedical classifications with folk classifications. These lists provide a useful reference to the many names for plants, the illnesses they are used for by different people, and some correlation with scientific botanical names and biomedically-defined illnesses (e.g., Berlin and Berlin 1996). However, they do not explain reasons for the selection of one plant rather than another in practice, or how the different uses of plants are embedded in different contexts, each requiring a special purpose classification and different selection criteria. Such studies provide few insights into the underlying cultural system or classification structures on which they are founded and do little to explain the multiple forms or variations in classifications for the different contexts plants are used in.

Parallels to this theoretical argument can be drawn from the late 19th century and the anthropologist Franz Boas' concerns over the arrangement of museum displays. Boas argued the character of an artefact was expressed not merely by its present appearance and that 'we need to study each ethnological specimen individually in its history and in its medium' (Boas, quoted in Cole 1999: 126). For Boas 'a priori environmental consideration was insufficient to explain the occurrence of similar phenomena, and that such theories ought not to be used in ethnology', a criticism of environmental determinism. Boas considered assumptions made from such museum collections were incorrect, because the pieces were out of context and therefore failed to carry their original meaning. By not providing context, Boas felt the museum arrangement deprived objects of their meaning. This is an argument that applies equally to medicinal plants in pharmaceutical laboratories and plant specimens in herbaria. They are no longer in their natural medium, so are in a sense not truly represented.

Ellen (1979, 1993 and 2006) has consistently argued that folk classifications have multiple structures, that classifications are situated in a social matrix and highlights the importance of context. These classificatory relations include: inclusion, exclusion, degrees of difference or likeness and taxonomic structures, and these need to be understood in their local cultural and social context (Ellen 2003). Studies such as

Berlin's are only able to provide a single cultural context of hierarchical and predominately binomial botanical classification typified by analyses that result from imposed classification structures on knowledge systems. It is important to differentiate between *identification* and *classification* of plants (Ellen 1993: 127-131) and place them in the respective categories based on informant's criteria, to uncover the rules used to identify each use context and category. The use of hierarchical taxonomic classification structures may dominate in monocultural and linguistic rural agricultural based societies located at the end of market chains (as studied by Berlin). In marketplaces, these classifications interact with specialist use-based classifications systems, where substitution of plant varieties from multiple cultures and linguistic groups requires understanding the reason for variation and underlying selection criteria.

Medicinal plant surveys often reveal the existence of what Bye, Linares and Estrada (1995: 72) refer to as *medicinal plant complex*, in which taxonomically distinct plants share a common name, traditional remedial use, and certain morphological and chemical properties. The authors' study found that for each medicinal plant complex, while species extended the length of Mexico usually only one dominant species was universally recognized as the best form. This dominant species is often made available beyond its geographic range through the marketing system, although if it was unavailable a local form, (i.e. local species) was used, whose use was usually limited to their native range. This highlights the need to differentiate between plant names for identification and plant categories that represent criteria that relate to their use.

Ellen (2003) and Hunn and French (2000) have shown that folk classifications not only differ but can combine multiple classification structures. Further, we need to be careful in separating out the metaphorical from the actual use of the classification of objects. A name can be used in a complex of multiple classifications, which have different meanings in different contexts. Hunn and French's (2000) work with the Sahaptin speakers of the Columbian Plateau demonstrated that the taxonomic principle of 'inclusion by which taxa at one level or rank are subsumed by those of a higher rank, basic to Berlin's hierarchic scheme of folk biological classification and to Linnean taxonomy, is but one way to organise a set of folk biological taxa (Hunn and French 2000: 118). Hunn and French demonstrate that the Sahaptin speakers show an extraordinary lack of hierarchical structure, and that 'naming conventions are but one of

several naming patterns indicative of structural relations among taxa' (ibid: 122), that not all binomial forms are valid as specific names, and that one is not always considered a kind of another but a species in its own right (ibid:131). In these cases of classification coordination between basic level taxa becomes 'focal, the other peripheral, rather than hierarchical subordination between taxa at higher and lower levels or ranks of a taxonomy' (ibid: 133). Both Hunn and French, and Ellen's work have demonstrated that ethnobiological knowledge can be organised into multiple classification structures and these need to be linked to the context and use of the objects in question and people's relationship to them.

This review emphasizes the cultural basis of biomedicine and scientific taxonomic classification is not an exclusive categorical classification system but simply the dominant system in a particular society at a moment in time for a specific purpose, primarily standardisation. Any marketplace, or similar meeting ground for multiple cultural systems, also needs to consolidate and standardise multiple local classification structures for plants from different places. By its very nature then, the marketplace is the centre of a network composed of multiple, localised forms of knowledge. This is not to say it is inferior, it simply has a different structure and purpose: to adapt to local social, cultural and environmental contexts. While the Bolivian State medicinal plant classification and validation system is grounded in the botanical classification of plants and their pharmaceutical properties, the marketplace trader is concerned with the outcome of plants when used as medicine in a pluralistic medical context based in pharmaceutical, ecological and social classifications. The study of knowledge transmission in the marketplace therefore requires analysis of the different classification structures used for plants between producers, traders and specialist groups of users.

2.2.2 Ethnobiological knowledge transmission and distribution

Many studies portray specific groups of people, places and parts of knowledge systems or bodies of knowledge as uniform and static, or frozen in time. They often fail to address knowledge as a holistic and dynamic entity in time and space. More recently this has been recognized as a problem, as Wyndham comments, 'The study of the

transmission and acquisition of plant knowledge, including names, use, ecology, lore and spiritual relations, involves learning in social, cultural, biological and physical environments and thus requires a holistic view' (Wyndham 2002: 549). Studies of knowledge now focus on the dynamic aspects of its creation, loss, acquisition and transmission (see Ellen 1996; Sillitoe 1998; Ellen and Harris 2000). More recent studies have focused on 'local', 'traditional' and 'folk' knowledge or 'folk science', and unlike the lists of plants and uses produced in earlier work, these have developed theories of knowledge of the complex social and ecological interrelations with plants, and concerning the transmission of this knowledge. Never the less the continued use of lexical lists as representations of wider knowledge systems continues to be a problem.

The distribution of plant knowledge is embedded in the matrix of social, cultural and ecological relations and processes (Etkin 1993: 104) thus being an interconnection of people in space and time. By analysing the social and environmental conditions that gives rise to different forms of knowledge, the cultural systems that people use to represent and transmit their experiences and knowledge between each other, and between other social groups within these cultures, becomes apparent. The social divisions that mediate peoples' experiences and access to knowledge highlighted in recent ethnobotanical studies include gender (Howard 2003) and age (Zarger 2002), and relate to labour and the social division of roles in communities. These studies of 'traditional' or 'local' knowledge have focused on defining knowledge and the pathways for its acquisition and transmission (see Ruddle 1993; Wilbert 2002; Zarger 2002). Yet the definition of what constitutes indigenous, traditional or local knowledge is often unclear, rarely being treated empirically as a dynamic and evolving entity (Ellen and Harris 2000: 4-5).

Ellen and Harris consider that the basis of conformity in indigenous knowledge is localised by people's quotidian experience of everyday life in a place, and that indigenous knowledge is fluid and transforming; it does not exist in its totality in an individual or place, being distributed within a community asymmetrically, for example by age or gender. The argument for variation and the problem of the omniscient informant was set out by Ellen (1979), from findings of variation in Nuaulu knowledge for the identification and classification of animals. Ellen contested the hypothesis of

ethnographic analysis of categories based on assumptions of cultural uniformity. Ellen stated that for a single body of data there may be variation according to many criteria which are often cross-cutting and reinforce each other irregularly. 'The products of classifying behavior inevitably reflect the immediate social conditions of the situations in which they are used' (ibid: 337). Studies of this variation in knowledge include the work of Hays, (1976) and Boster (1986) who found that variation in ethnobiological knowledge of plant classification was the result of specialisation and participation in tasks with different members. Specialists exist by virtue of experience, ritual or political authority (Ellen and Harris 2000: 4).

Indigenous knowledge is preserved through memories of individuals and often represented through symbolic rituals. Knowledge is complex and multi-dimensional. In one dimension it is linguistically encoded (e.g., plant names), and studies often isolate this empirical knowledge from the local cultural context in which it is applied (Sillitoe 1998: 228). The use of local plant names and systems of classification (see Berlin and Berlin 1996) for ethnobotanical and ethnomedical studies often fail to account for a specialist's extensive knowledge of individual species or a general knowledge of many species. By focusing solely on what is expressed, categorised and classified in language, we may inadvertently eliminate other dimensions of knowledge that are not linguistically encoded but equally important. These other aspects include local perspectives and cultural beliefs, reflected in people's perceptions of themselves and their environment and reflect traditional practices of ecosystem management. It is important not simply to consider knowledge as bits of information or what is known, but how it is learned (Mercurieff 2002). Knowledge is situated in a practical engagement in the world (Ingold 2000 and 2001) and knowledge itself is procedures: ways of knowing and *performance skills* (Richards 1993; Ellen 1996). 'Social mechanisms behind these traditional practices include a number of adaptations for the generation, accumulation and transmission of knowledge' (Berkes et al. 2000: 1251).

Cultural transmission itself is a process of social reproduction in which the culture's technological knowledge, behaviour patterns and cosmological beliefs are communicated and acquired in a social context (Cavalli-Sforza and Feldman 1981). In the Cavalli-Sforza and Feldman (1981) model of cultural transmission, knowledge is

transmitted vertically from parent to child, horizontally between individuals irrespective of relationship, with a distinction between horizontal transmission within a generation, and oblique transmission between generations. Studies of cultural transmission show that knowledge is more likely to be transformed in certain forms of distribution (ibid). Vertical transmission (from parent to child) is considered to be highly conservative, while horizontal transmission between individuals, both within and across generations, facilitates the transmission of novel trends in popular culture (Hewlett and Cavalli-Sforza 1981). The distribution of knowledge is considered to be a result of a network of unequal, asymmetrical social relationships, including kin relations, and social standing in a community, whereby an individual's knowledge is, in part, the product of an intersection of these modes of transmission. In his study of horizontal transmission among Aguarana women, Boster (1986) showed that individuals learn by many means, including oral instruction, imitation and personal trial and error. Their personal abilities (in a biological sense), motivation, learning opportunities, and repetition of experiences, all contribute to the extent of their knowledge.

Studies of medicinal plant markets have looked at the transmission of local names and uses of plants along market chains. Bye and Linares' (1983) study of medicinal plant markets in Mexico found that the flow of information demonstrated both continuity and discontinuity between supplier and consumer in knowledge of nomenclature, uses and properties of plants. Their results show both differences in the names used for plants between source area and consumer, and cases of continuity with the same name used at source and by supplier. For specialist collectors there was continuity in the flow of information between source and consumer. Cultural interactions with medicinal plants can bring about changes in a particular plant's or remedies' importance. These changes of importance can be described as a continuity, a disjunction, a discontinuity or a synchronism (Bye et al. 1995: 75). The continued use of plants where the context and element (plant) are unchanged is a continuity. Where the cultural context of a plant's use has changed, e.g. from use as a healing aid to a food, this represents a disjunction. Synchronism demonstrates the substitution of elements from one social or cultural group to another. These include the substitution of plant species as is the case with European and the new world flora in the Andes, or shared concepts of independent

origins, as in the case with the classification of plants and illness into the categories of hot and cold found in Latin America.

Migration to urban areas also brings changes in economic and social conditions that influence the availability of flora and types of health constraints. A study of cross-cultural adaptation of traditional health care practices and changes in medicinal plant use among the Columbian community in London found both continuity and the incorporation of new remedies into the folk pharmacopoeia (Ceuterick et al. 2008). The results show continuity for flora that was available and had a perceived efficaciousness, while adaptation strategies of migrants included substitution and adoption of better alternatives. The study also identified where remedies and plants act as ethnic markers. Further, these act as symbolic-cultural motives that influence continuity for the use of flora and practices even when they are not always regarded as pharmacologically efficacious. The study of knowledge transmission in market chains needs to recognise cultural motives for continuity and that the adoption of new elements into health systems may be used to change social status or adapt to new health constraints.

When studying cross-cultural knowledge transmission in market chains, indigenous knowledge can rarely be treated as an isolated domain, especially where local subsistence interacts with commercial markets (Osseweijer 2000). The process of acculturation or adopting new cultural values is dependent on a multitude of individualistic social and economic variables that influence the transfer events and processes. To study the transmission of medicinal plant knowledge in the marketplace requires an understanding of the social context of the marketplace. How the traders are interrelated in a social network and what the social system and mechanisms are that enable the transmission of cultural knowledge about medicinal properties of plants. Such information cannot simply be drawn from a list of different traders' knowledge of plant names and uses, but needs to be understood alongside its embedded context of how the plants are selected for each use and how this is interpreted in different classification systems. To study cultural transmission in the marketplace requires studying the practices, social institutions, rules and regulations that determine the cultural knowledge and worldviews that encompass medicinal plant use and the process of trading.

Ethnomedical and ethnobotanical studies in South America, and Bolivia in particular, are no exception to the trend for 'list making', with an extensive catalogue of lists of plant species and their associated uses using biomedical terms. In addition to these lists, there are a second group of studies of Andean medical beliefs, of how people relate their health to their relationship to the environment as an etiology of illness. The first group of studies list over 1,600 medicinal plants for Bolivia collected from diverse environments (Kokoska and Cusimamani 2008). Studies of ethnomedicinal beliefs are available for Quechua, Aymara and Trinitano, and for environmental regions such as highland, valley, lowland, identifying different localised and cultural forms of medical knowledge and explanations for plant healing properties. However, these studies rarely consider or combine the interaction between botanical lists, folk classification and explanations for plants used in different cases or locations. Adaptation to the Andean region is characterised by the development of exchange systems to access resources distributed across multiple environmental zones (Buechler 1983). Exchange has enabled groups to access plants from many zones, and with them has come knowledge about their uses and much more. This exchange links the specialised local medicinal knowledge of plant properties and the experience of their production as a resource with wider inter-cultural systems and groups with different languages and beliefs. The study of marketplaces needs to uncover the multiple specialist classification systems for medical plants that result when multiple local social cultural contexts are combined and interpreted in the marketplace.

Nash's (1966) study of the rotation of several subsidiary marketplaces around a central marketplace in highland Guatemala, found that the system was tied to the annual ceremonial cycle of the society. Among these communities the degree of specialisation, in products and services arose from ecological conditions, highland-lowland proximity, social conditions, and trade relations. In these market systems a civil-religious hierarchy runs public life in the sacred and secular spheres, and wealth-levelling functions are common to the system throughout the region. In contrast, in Oruro the weekly markets form a regional system that is centred in the city of Oruro. The weekly and annual markets held in Oruro are not tied to ceremonial cycles. An important question to answer is how local specialisation is formed in the system and is regulated through the civil-religious hierarchy.

The market stalls for medicinal plants in Oruro supply and incorporate Altiplano, Amazonian and coastal Pacific environmental regions and medicinal and ritual products, as diverse as starfish and orchid roots. The local exchange systems and the marketplaces of Oruro do not follow the models of regional exchange as described for Mesoamerica by Nash (1966). Rather, they form part of wider exchange circuits with communal or itinerant exchange between distant ecological regions described as ‘verticality’ by Murra (1995) and long distance trade through annual markets (*ferias*) as described by Bromley et al. (1975). In this diverse ecological socio-economic landscape each permanent or temporary marketplace itself forms a centre of specialisation that incorporates multiple regional systems and is embedded in larger long distance trade systems. Understanding medicinal plant trade requires understanding how the marketplace interacts with the different circuits of exchange, and how these influence perceptions of the medicinal plant products sold there.

In recent years, the medicinal plant markets of Oruro have been affected by multiple economic and social factors that have influenced patterns of supply and consumption. The most recent changes have been increased temporary tourism, changing social acceptance of traditional ritual and healing practices, improved and changing modes and routes of transport and urban migration. Most recently, the declaration of the Carnival of Oruro as Intangible Patrimony of Mankind by UNESCO in 2003 is considered to be the cause of increased demand for plants used in the ceremonial rituals by different social groups performed throughout the city (Personal communication with traders).

The distinction between types of knowledge as ‘local’, ‘traditional’, ‘folk’ and ‘indigenous’ set against scientific knowledge of the modern or western world view gave rise to groups who politically took ownership of this kind of knowledge, made claims for authenticity and constructed ‘indigenous rights’. These claims of ownership and authenticity are located in a place or environment, within cultural groups and specialist ‘traditional’ practices or ways of knowing. Medicinal plants provide an ideal domain for biocultural analysis as they are formed from both ‘local’ knowledge of ecology, pharmacopeia and healthcare, and wider economic importance in exchange and trade at a national or even global level. Furthermore, the domain of medicinal plants provides a link to understanding wider knowledge systems, as the domain is formed from the

overlap between the category of plants represented as natural biological classification, and their special purpose use as medicine. Thus, this thesis aims to identify how the marketplace acts as a social and cultural institution, to regulate and authenticate medicinal plants and how this knowledge in turn is valued and interpreted by different social groups.

2.3 Medical anthropology and ethnomedicine

In an early attempt to classify illness, Foster (1976) described two categories or types of illness ‘*naturalistic*’ and ‘*personalistic*’. In his classification Foster considers ‘natural’ illness to be caused by biological means and *personalistic* to be caused by ‘spiritual’ causes. This provides one model to understand interpretations of causes of illness in ethnomedical systems. The predominant critique of this classification by Kleinmann (1980) said that the use of imposed *etic* categories that do not represent or understand variations can not be used to understand ethnomedicine. Kleinmann uses the example of variation between the patient’s view (*emic*) and specialist healers’ (*etic*) classifications of illness. Kleinmann emphasised that the difference between natural explanatory models used of illness episodes by specialist doctors, and personalistic explanations by patients, create two classification systems for a single illness. Categories of ‘naturalistic’ and ‘personalistic’ may also differ between cultures.

2.3.1 Medical pluralism in an Andean context

Medical pluralism is the fundamental theory of ethnomedicine used to describe the simultaneous existence of multiple explanations for illnesses and their treatments. As such, folk classification and biomedical classification are not always synonymous and need to be understood in their cultural context. Of relevance to this thesis, Bastien’s (1995) study of interpretations of tetanus in Aymara, Quechua and Guarani speaking communities has shown that the classification of illnesses such as tetanus for Aymara, living on the Altiplano around Oruro, are formed by a complex of biomedical illnesses with the same symptoms. The study also found that this complex differed for the Quechua communities located in the valley and for the Guarani located in the lowland plains. Theory drawn from ethnomedicine can be used to interpret Andean forms of medicinal plant use and classification.

Crandon-Malamaud's (1986, 1991) study of rural highland Bolivia lays the foundations for understanding medical pluralism in a social and political context.

In environments that are ethnically and medically pluralistic (as found in Bolivia), medical dialogue is an arena in which political and economic processes take place. Through medical dialogue, the content of ethnic identity is constructed and negotiated. Medical dialogue therefore can serve as a window through which one can view social processes. Data from a rural highland Bolivian town demonstrate these theses, which have implications for the common dichotomy in medical anthropology that divides medical systems into "traditional" and "modern". (Crandon 1986: 436).

Crandon-Malamaud's work has led to further studies in Andean medical pluralism and understanding of the symbolic, social and political relationship between 'state' and 'traditional medicine', see for example Zulawski (2007).

Bastien's (1987a and 1995) studies of the communities in Bolivia has shown that explanatory models can differ between cultures, and that medicinal plant remedy contexts are both social and ecological. In a study of *chagas* disease in eastern Bolivia, Bastien (2002) found local people used a spiritual explanation to justify the selection of plants for their folk medicine. The use of a spiritual or personalistic explanation led to the medicine being placed in the category of ritual by local medical doctors. Further analysis, however, found the plants to be an effective deterrent for the vector of *chagas* disease because of their chemical pharmaceutical properties. Thus are biomedical doctors, and others, led to mischaracterize and under appreciate the mechanisms and complexity of local treatments assumed to be "spiritual". Furthermore, the research showed that for a plant to become a medicine it needs to meet certain social criteria of the form of use and social authority of the practitioner who administers these.

Remedies used for illnesses with unnatural entities as part of their explanatory model, including environmental phenomena, witches and mythical creatures, often have biological properties which are regulated by ritualised forms of use. The ritualised forms of medicine used for these illness are not simply sociological; they require further investigation into the plants' biological and biomedical properties which may include

medical ethnoecology. Thus interpretations of the context of medicinal plant use also need to address the naturalistic properties of remedies and not simply disregard remedies because explanatory models do not fit conventional biomedical descriptions. This thesis thus seeks to record and build on the ethnomedical literature that considers the bulk of knowledge of the biological properties of medicinal plants, as based on observation, as empirical in nature and as including a set of social regulations for plant use. The study of medicinal plant knowledge in the marketplaces of Oruro requires understanding how this empirical knowledge is represented as classifications and how this in turn is transmitted between specialist and non-specialist users by market traders.

2.3.2 Ethnopharmacology

The classification of medicinal plant properties requires distinct classifications to those of plants; they need to incorporate the presence or absence of different properties, levels of toxicity and how these change when plants are processed or used in combination. Ethnopharmacology studies how different cultural groups use pharmacological knowledge (Etkin 1996). While medical anthropology has focused on the symbolic meanings of plants for people, ethnopharmacology focuses on the biodynamic qualities of plants, and argues that biological attributes are as important as symbols and values in the selection of particular species and the interpretation of their physiological actions. Research acknowledges the multiple uses of plants, and that the cultural and linguistic markers used for particular attributes of plants, can provide clues to a plant's bioactivity. Plants used by Yucatec Maya, for example, for digestive complaints, are responsible for both their astringent taste and efficacy and selection for the treatment of intestinal disorders (Ankli et al. 1999; Brett and Heinrich 1998). The complex cultural and environmental circumstances that create and result in knowledge of plant selection and use are a result of an ongoing interaction with the environment and other groups.

The medicinal benefits of food form an important cross-cutting category for medicinal use between bioscience and ethnopharmacology. Examples include the antioxidant lycopene, which gives tomatoes their red colour and diminishes the risk of cardiovascular disease and cancers of the digestive tract and prostate (Rao and Agarwal 1999). Similarly, sulforaphane in broccoli has anticancer activity; hesperidin in grapefruit inhibits poliomyelitis, herpes, and influenza viruses; capsaicin in chili pepper lowers the risk of stomach cancer; sulfides in garlic and onion inhibit blood clotting;

and glucaric acid in oranges lowers serum cholesterol (Montanari et al. 1997). Such knowledge is often not apparent in lists of medicinal plants and constitutes a much wider cultural knowledge of social health care and diet. The study of medicinal plants used by Andean people requires understanding how these properties of plants are classified and transmitted in lexical and cultural terms.

The classification of combinations of chemical compounds within plants and plant mixtures is an area of study within ethnopharmacy that has not been fully addressed and is an emerging science. Medicinal plant cures often consist of mixtures of plant species, although little is known about the mixtures' floristic composition, their complex phytochemistry (Bussmann et al. 2010) or how plants are selected for these mixtures. In Dominican traditional medicine the composition of mixtures used varies between lay people and specialist healers, and people believe combining plants increases their potency and versatility (Vandebroek et al. 2010). In Northern Peru mixtures used for the same disorders have similar floristic composition and healers employ specific guidelines in the preparation of mixtures. For these mixtures there seems to be widespread exchange of knowledge about mixtures used to treat bodily disease while those used for spiritual, nervous and psychosomatic disorders are more closely guarded (Bussmann et al. 2010). Bye and Linares's (1983) survey of medicinal plant mixtures sold in marketplace of Mexico City also found consistency in the use of specific plants for classes of ailments. For each class a fundamental plant or plants was always included and combined with supplementary herbs depending on variations of the illness, severity and time of year. In addition the balance of the mixture in terms of hot and cold classification was often taken into consideration with supplementary plants added to the fundamental plants to provide the correct hot-cold balance.

Combinations of plants may be able to explain documented inefficiency or toxicity of single plants (Bussmann et al. 2010), although variation in medicinal plant mixture formulae alone cannot be used to explain the selection criteria used for mixtures. This thesis begins to address the issues related to the combination of compounds by comparing variations in medicinal plant classifications for plants when used alone and when in combination with other plants.

2.4 Economic Anthropology of Medicinal Plants

This section reviews the literature that relates commodities and ethnobotanical and ethnomedical knowledge systems. Importantly, the literature suggests that the process of commoditization, may create new kinds of knowledge, but also creates problems in transmission especially over long distances.

Research in economic anthropology shows that the basic non-economic function of markets is their role as nodes in networks of communication, being important centres for the dissemination of information (Bohannan and Dalton 1965). Furthermore, purely economic exchange of goods cannot exist without other social relationships and such exchange is not separate from the social, religious and political sphere (Plattner 1989). Not surprisingly then, traders are the anthropological focus of a market as a social system, and the process of trading is often conceptualised as a structured flow of information through the market (Alexander 1987). Thus, the study of traders requires analysing the social origin of the trader, their careers, and social institutions that link their complex web of social relationships (Bestor 2004). In the market chain and marketplace, objects do not take on a value until given a social perspective (Appadurai 1986). For medicinal plants that value is their perceived efficacy as medicine and cultural interpretations of their ability to heal or prevent disease. These values are created and regulated through the interaction of different social spheres and how traders locate themselves and their products in these.

Geertz's (1979) analysis of marketplaces in Morocco found limited group loyalty in the Bazaar as one of the possible stratagems used by people, where 'the search for information one lacks and the protection of information one has is the name of the game' (Geertz 1979: 29). Thus, a constant topic of marketplace conversation is information on prices; traders question their friends, their neighbours, and their own and other traders' customers. Relationships in the market provide not only commodities and credit, but also reliable price information (Alexander 1987). Geertz (1979) observed traders' strategies combined their clientele, spatial localization and specialization of trade along ethnic lines. The trader's attempt to counteract and profit from the system level deficiencies of the bazaar as a communication network was by improving richness and reliability of information carried over elementary links within the marketplace.

This was not an easy task, considering the irregularity, and uneven distribution of knowledge in the marketplace.

Marketplaces themselves constitute a multifunctional institution that provides a meeting point for people from different ethnic and social origin to exchange and redistribute local, regional and foreign goods (Bye and Linares 1983). Marketplaces are an arena of social interaction where identities, status and social boundaries are contested and represented by traders' products, services and skills. Families can combine economic, political and religious activities at one time and place (Plattner 1989: 170). Socialising is as important a feature as the economic aspect of marketplaces, where gossip and communication are common and encompass the experience of meeting old friends and travellers, reciting stories and experiences, announcing new discoveries, and discussing current market prices and availability. The daily, weekly and annual marketplaces and fairs of Oruro often coincide with Andean religious, agricultural, social and labour calendars where the festivities and rituals are vital functions of the marketplace. The social and economic interactions of the marketplace link the products or plants to the people and people to each other. Market chains from producer to buyer span political, religious and geographic boundaries.

As stated earlier, knowledge often passes through many different pathways apart from those of economic producer, intermediary and consumer. Multiple relations between social groups, households or families combine with the history and duration of these relations, which all influence actual knowledge transmission. Market traders of natural healing products actively seek out empirical knowledge about healing methods and a plant's efficacy. Both their reputation and livelihood are dependent on having and supplying reliable information on the availability, quality, price, efficacy and other factors that influence the use and availability of products.

The practical everyday application of knowledge and the interpretation of cosmological beliefs, values and practices are created and mediated by both local and exogenous forces. Where 'local' lifestyles or subsistence interact with wider exchange networks, commercial markets and preferences, actual knowledge arises from both local and exogenous sources. Due to social and economic restrictions, such as language or

distance from the marketplace, traders often act as the interface between local and exogenous knowledge. It is through these intercultural interchanges that knowledge can potentially be transformed or misrepresented. Alternative motives for the interchange and trade in the Andes of plants and knowledge apart from for economic gain and material subsistence include, political, ceremonial, religious or festive and cultural customs, which imply social and cultural knowledge and dynamics.

The great marketplaces of Mesoamerica had no Andean counterpart before the Spanish Conquest. The Inca state accumulated surplus, sustained its empire, and redistributed surpluses through symbolic gestures of reciprocity to its subject population. The Inca Empire, which stretched some 5,000 miles along the Andes, had no tribute payment in produce, institutions, or money (Larson 1995). Murra (1968) describes 'verticality' as the adaptive strategy in the pre-colonial Andes of exploitation of islands of ecological resources spread across an east-west axis, running from the Pacific coast to the Amazon. These 'islands' are defined as isolated communities or resources, sometimes over two days walk from main settlements and often via other groups' territories. The control of isolated resources within national states of the Andes by communities such as the Quechua still applies today (Wilson 1999: 300). The tribal societies of the Andean foothills and lowlands continued long distance trade of material goods and knowledge even after the political state rupture caused by and after the Inca. The interchange of knowledge was not only of the technical knowledge of things, but also their origin and meaning. These societies exchanged symbolic ideas and 'found a determined use of symmetry, as the means to overcome cultural differences' (Casevitz et al. 1988: 187).

In a very useful review of 'commodities in a cultural perspective' Appadurai (1986: 41), describes the types of knowledge related to 'complex, long distance, intercultural flows of commodities...where increasing distance has a potential compounding effect on discrepancies in knowledge about the commodities'. Commodities themselves represent 'complex social forms and distributions of knowledge' (ibid: 41). Appadurai recognizes two sets of knowledge associated with commodities, one related to commodity *production*, encompassing technical, social, aesthetic knowledge, and the other related to the appropriate *consumption* of the commodity. He suggests that knowledge distribution is not linear, it does not flow from production to consumption,

but instead it is unevenly distributed at different moments in the “life histories” or “careers” of the commodity in question.

Appadurai considers ‘the production locus of commodities is likely to be dominated by culturally standardized recipes for fabrication’, where production sites have highly standardised forms of technical knowledge (ibid: 42). With medicinal plants there is a distinct difference between recipes and technical knowledge. For medicine, a recipe is based on specific measurements of a set of ingredients; while the ingredients may vary, the expected outcome of the medicine may not. For pharmacology, the critical knowledge is the active property of a medicinal plant, strictly speaking a chemical and not a plant. The standardisation of recipes in the case of medicine is based on properties of the ingredients and their purpose in the final products. The role of combining items is an elementary process, while the selection, adaptation and substitution of items is a specialised skill requiring an understanding of sociological and cosmological knowledge, related to complex and ongoing relationship between plant species selection, medicinal properties, ecology, and health outcomes.

In pluralistic medical systems it is necessary to define which property of a desired outcome is standardised and which enables variations. For medicinal products, the creation of variation is in itself a standardisation of the form they take, that is to say a particular medicine may consist of three plants, but it may be the fact there are three plants, and not which three plants, that is of more importance for the medicine to be efficacious. As Appadurai recognizes, ‘technical knowledge is dependent on cosmological, sociological and ritual assumptions’ (Appadurai 1986: 42). This technical and specialist type of knowledge varies socially, by age, gender, specialist artisanal skill, caste or specific villages, and has been the focus of much ethnobotany research within communities and between communities.

The other form of knowledge is that held at the destination, in the market or by the consumer. Typically, this knowledge is specific to a consumer’s social and cultural needs and requirements; but they are also somewhat at the mercy of what merchants tell them they are buying. Thus, while it is considered the link between the local and external, the demand for production is for all intents and purposes in the hands of the trader, who provides the bridge between knowledge for production and the use of

products. Appadurai (1986) highlights the distance between production and consumption using the example of Borneo forest dwellers having little idea of the final destination and use of the swiftlet bird's nests—used in Chinese medicinal and culinary practices—that they collect and sell to intermediary merchants. However, it is not that they do not know that bird's nest can be eaten, but they lack the instructional specialist knowledge to be able to use their commodities in similar ways.

Unlike the example given by Appadurai, Bolivian medicinal plant products' end uses are a clear market for local Andean communities who are far from isolated but are integrated and informed. A key feature of the medicinal plant market is the ability of traders to regulate quality and prove the product is not a fake or adulterated. Referring to the luxury commodity trade, Appadurai notes that the authenticity of art and rugs requires that such regulations be enforced by institutions of the state or other formal bodies (Appadurai 1986: 44). The establishment of these policing institutions enables authenticity and thus confidence, in which traders and sellers are regulated and products tested and defined, creating distinct categories, with forms of retribution for customers to claim against. For medicinal plant products, these institutions include state and international bodies who control pharmaceutical and medical products. While the medicinal plant market is seen as a more open system compared to the state pharmacy, my research suggests it is a highly regulated social system with distinct rules for entry and hierarchy of traders based on the quality of their goods. The traders themselves are reliant on their reputation, their ability to distinguish themselves from other forms of healing, and to protect themselves against adulterated products or competition from incompetent practitioners who would damage their reputation and thus their potential profits.

Referencing Taussig's (1980) study of mine workers in the mining town of Oruro, Appadurai considers the role of ritual *mesa* and offerings performed by mine workers for good health as one of 'disarticulation' of the peasant from the end user, forming the basis for the loss of knowledge about final consumption or control over it. The ritual is considered a way to regulate, and as a metaphor to reconcile, the disproportionate distribution of wealth, and potential for illness when working in the mine. In contrast, Nash's study of rural miners and ritual practices in Bolivia tells a different story. Nash describes the ritual offerings and carnival associated with it as a form of social cohesion

for workers. These peasants, far from the disarticulated and ignorant miners of Oruro, are a savvy group and use the ritual to unite as a political and social institution against the state and international consumers. Nash's study highlights the integration of rural lifestyle and economy into international markets in Bolivia. Buechler and Buechler's (1996) study of market traders in La Paz, Bolivia, also highlights the importance of social institutions and ritual in linking distant spheres of production and consumption. While Taussig demonstrates how ritual is used to regulate the inequality in resource distribution, Nash has clearly demonstrated its importance in linking people of common trade into institutions and common identities placed against the wider ethnic and national social system and international commodities market.

This review of economic anthropology highlights the importance of social institutions in the marketplace and their role in regulating trade and the quality of products. The transmission of knowledge is dependant on the ability of different groups to reproduce their knowledge in different forms that include rituals. It follows that the study of medicinal plant knowledge transmission requires data on rituals and cultural values used in the marketplace to regulate cultural knowledge transmission. Such a study would also require data on the social institutions and forms used to recreate cultural values, worldviews and practices that enable adaptation to changing social and economic circumstances.

2.5 Summary

The ethnobiology review shows that knowledge transmission studies need to incorporate both linguistic and cultural expressions or representations of knowledge, that knowledge may vary between specialists, producers and consumers and needs to be interpreted as a dynamic system. Such studies need to incorporate the social and cultural context and mechanisms used for transmission to be able to draw conclusions on how marketplaces and market chains function as institutions and to transmit cultural knowledge. Further when analysing multicultural folk classifications structures, variation needs to be explained through the social context of use and the criteria for selection into categories, and not by lexical variation alone. The medical anthropology review highlights how variation in the category of medicine can result from different illness explanatory models and in the different complex of illness for specific

symptoms. These variations may represent social, ecological and cultural variations in the population and the biological role of plants for diet and ecological control in medical systems. Ethnopharmacological studies show medicinal plant knowledge needs to incorporate remedies prescribed for diet and known biological causes, and uncover the rational and 'rules' for the selection of plants for aliments and for mixtures. Economic anthropology shows the importance of studying social dimensions of economic institutions', their relation to knowledge transmission and their role in regulating cultural patterns while enabling adaptation.

Chapter 3

Methods and Methodology

3.1 Introduction to Methodology

This chapter describes the methodological orientation of the thesis, methods used for collection of data and problems encountered with data collection and analysis. The marketplace, as part of a wider (and often unclear) social and global network, presents what would appear to be a problematic setting for structured ethnobiological research. This is partly due to its constantly changing form, with multiple cultural groups, people coming and going, and traders claiming variable, and often incomplete, inventory of plants from multiple ecological regions. Yet it is this very characteristic of the marketplace as a dynamic multi-cultural centre and constantly changing network of knowledge systems that forms the focus of this study. I have drawn upon methodology of ethnobiology, and economic and medical anthropology to focus on how the target domain of medicinal plant knowledge is interpreted and used, through its commoditisation; and how this knowledge is understood in different locations and influenced by different social groups. This lies in contrast to the more traditional, ethnographic studies of specialised localised ethnobotanical knowledge of a single group, usually of one cultural living in one ecological zone. The trend of studies of knowledge transmission has followed this approach by looking at continuity and distribution of knowledge within a homogenous, somewhat isolated cultural or ‘indigenous’ group and their bound ecological zone. It is only more recent work on commodities (see for example Appadurai 1986 or Bestor 2004, and Pieroni and Vandebroek 2007 for medicinal plants in particular) that have begun to challenge these studies and look at a single object across multiple cultures, or a single culture in multiple locations.

Where cultural knowledge is encoded in a lexicon, how this knowledge is interpreted will be dependant on the cultural contexts in which it is decoded (Ellen 2003). Ethnobiology has sought to understand lexically-encoded knowledge by linking it to general environmental knowledge of ecology and the use rationale of how people understand the interrelation of humans and their biota, and not simply the

morphological similarity between plants. In the context of health and exchange, the combination of medical and economic anthropology provides, respectively, the social and cultural context for interpretations of explanations for the interrelation of health, environment and exchange by different groups.

In order to elicit data on cross-cultural classification for plants, medicine and illness it is necessary to draw out the social and ecological matrix which medicinal plant knowledge is located in and how traders access this knowledge within the marketplace. Participant observation (Bernard 2002) while living in Oruro provided a gateway to understanding how medicinal plant knowledge is constructed, classified, perceived and contextualised by different actors, and how it is linked to ecological, environmental, political, economic and social contexts. The methodology combined qualitative data collection with quantitative data through purchases of medicinal plants as voucher specimens and recording names used for plants, medicines and the illnesses they cured. To uncover multiple cultural explanations for plant selection for herbal medicine and healing ritual, participant observation and 'experience' of preparing medicinal mixtures were used. To do this, standard methods from medical anthropology and ethnopharmacology were used (Etkin 1993). This highlighted multiple classification structures, where variations in explanations for plants' healing properties were reflected in the overlap of multiple uses, and by the different ingredients used for mixtures or for illnesses. The multiple criteria used to define the category of medicine and ritual were then placed in local social contexts by the actors' narratives and constructions of place and social identity.

To find out how social identity was used as a marker for medicinal plant knowledge, social boundaries of actors and institutions were explored by recording actors' narratives that related to the category of medicinal plant knowledge. This identified how the variations and forms of medicinal plant knowledge are interpreted, contextualised and represented by different actors in the marketplace itself and influenced by the 'surroundings' of wider social, political and economic institutions outside the marketplace. This draws on what we know of the anthropology of the marketplace as both an economic and social space (Plattner 1989), where commodities have a 'social life' (Appadurai 1986). For the purpose of this study I have interpreted the commodity to be medicinal plant knowledge, and use the work of Bestor (2004) who, in his study of

the fish market of Tokyo, emphasises the role of the marketplace as a centre for the production of culture and the centre of a knowledge network. Bestor emphasises how the market itself forms a cultural centre where its products, their production skills and the city itself are interlinked as a cultural identity.

To understand how the domain of medicinal plants is interpreted in one place by different social and cultural groups and in different places by other groups required a multi-sited approach. This enabled me to see how medicinal plant classification criteria relating to social, political and ecological boundaries are formed, and used to define cultural explanations of plants' medical action and efficacy by groups within and between marketplaces. I was not looking at a specific indigenous group or ecological region, but a network of knowledge formed of multiple specialist local regions and groups. This study looks at how the marketplace itself is defined as a cultural institution and how medicinal plant knowledge is defined by local, national and international perceptions of the medicinal plant traders.

To achieve this, I employed a range of methods from the natural and social sciences. This combination of methods provided answers relating to the three questions: how criteria for each set of knowledge are established; how knowledge is organised into social hierarchies and located in the inter-relationship between social and political institutions and groups formed within the marketplace; and how social identities are used as markers for medicinal plant knowledge and used to form social boundaries in the landscape and zones within the city to legitimise types of medicinal plant knowledge. This information indicated how social markers and identities were used by traders to define the boundaries of knowledge between external institutions, marketplaces and stallholders, and to place medicinal plant products into local social and ecological contexts.

I partook in marketplace life, observing and participating in transactions or events and following traders through both private and public rituals and celebrations that contextualised actors' identity, social hierarchy and medicinal plant knowledge in wider social settings. Market visits involved sitting with traders at stalls, helping to prepare mixtures, purchasing products as a client, accompanying traders in annual rituals, purchases of stock, and listening to stories or extensive discussions on opinions of

different group's knowledge. This last aspect of defining identity and knowledge through personal history and experience using participation and stories provided the narratives used by traders to construct their identity, and to compare and legitimise forms of medicinal plant knowledge.

3.2 Methods Summary

A combination of quantitative ethnobotanical and qualitative anthropological methods were used to gather data. Ethnobotanical market surveys, botanical specimen collection and structured interviews with traders, buyers and plant collectors (Alexiades 1996; Cunningham 2001; Martin 1995) were used to elicit categories of plant, illness and medicine, to establish local nomenclature, folk and botanical classification, and delimit the ecological distribution of plants in the marketplace and their original environments. Market networks showing the movement of plants were drawn out (Cunningham 2001). Anthropological methods of participant observation (Bernard 2002) were used to uncover the practical, unspoken cultural contexts governing the social hierarchy of knowledge construction, knowledge transmission, local contexts and social regulation of knowledge holders.

Collections, interviews and participant observation were carried out with traders, gatherers and clients at marketplaces in Oruro city, on trading trips to rural and regional markets, as well as periodic and annual markets in Oruro and around the city of La Paz, between March 2005 and May 2006. Of particular importance were ritual events and the visits to, and purchases at, annual markets where it was possible to document the progressive form of relationships with people who only met once a year.

Over six hundred plant specimens were collected, and the classification of three hundred botanic species were confirmed by the National Herbarium of Bolivia in La Paz (see Appendix 1). Over two hundred hours of open interviews with medicinal plant traders and 'transaction events' between buyer and seller were recorded and transcribed. Transcriptions were analysed using qualitative methods, primarily comparing plant, medicine and illness classifications by different people in similar contexts, and by the same people in different circumstances to elicit the multiple uses and contexts of plants' medicinal uses.

Before beginning my fieldwork, I agreed to follow the national convention for scientific studies and botanic collections in Bolivia, with a signed agreement to work with the National Herbarium, and agreed to leave a set of voucher specimens and a copy of the completed thesis. This was accepted by the Ministry of Biological Diversity of Bolivia. The results I have provided of plants' medicinal uses have been previously reported and documented and do not present new issues of intellectual property rights. Rural communities have a clearer process to gain access and to conform with national and international regulations, embedded in national political recognition. Medicinal plant marketplaces can form a grey area, where ethical issues and intellectual property rights are unclear. In Oruro, I received written consent from the Municipal Government to perform market surveys and work in public places.

3.2.1 Voucher specimens and botanic classification.

Botanic collections and classification of voucher specimens followed established ethnobotanic guidelines (Martin 1995; Cunningham 2001). Copies of voucher specimens collected were deposited with the Bolivian national herbarium, Herbario Nacional de Bolivia (LPB), in La Paz, in accordance with national regulations and the International Convention of Biological Diversity (CBD). In addition to the pressed voucher specimens, a collection of incomplete or non-standard plant parts were also deposited. These were organised into collections of: roots, leaves, seeds, resins and woody parts. Botanic taxonomic identification of voucher specimens and medicinal product samples collected during fieldwork were carried out at the national herbarium. Classifications were confirmed against specimen vouchers and the nomenclature of families, genera and species with the most current available literature. Specialists for local flora at the herbarium confirmed specimen identification. Nomenclature for voucher specimens and author names were checked against the International Plant Name Index (IPNI) or the TROPICOS online database. In some cases, the condition of samples (i.e. chopped and dried parts) prevented an accurate taxonomic identification. Here, classifications were made by combining the common name and the region of plants origin with those in ethnobotanical texts for Bolivia.

3.2.2 Folk classification

A portable reference collection of samples was created on the basis of local names and using folk classification criteria. This enabled folk categories and classifications both within single botanic species and across multiple botanic species to be teased out. Selected stallholders were asked to list the names and folk ‘classes’ or varieties for botanic specimens selected from the folk medicinal use categories of herbal or natural medicine and ritual *mesa* cures of *k’oa mesa* and *mesa negra*, and folk illness categories including *susto* (fright) and *aire* (air). Classification by folk botanic genus, species and variety were elicited for plants with multiple use categories of herbal and ritual, or internal and topical forms of treatment to enable the identification of criteria used to classify plants in different use categories. Folk classifications were also elicited for species with a wide common distribution and many varieties; the folk genus or species *wira wira*, *k’oa* and *itapallu* were chosen among others for their widespread recognition of use for a single illness and for multiple botanic species from different botanic genera.

3.2.3 Language

Whilst I had gained a reasonable level of Spanish from previous fieldwork in Bolivia and Oruro, I attended intensive language training in Oruro for Quechua. I was able to attain a conversational level of Quechua for the occasional monolingual speaker I encountered in marketplaces. Interviews with participants in Quechua and Aymara were performed with a local assistant and translator. One feature the language school demonstrated is the clear difference between academic Quechua and that used in practice in the marketplace, and that literal translations were not applicable. The use of the word *kuti* provides an example, literally translated by people in Oruro as ‘to return’, it is also used in the marketplace to mean ‘to cure’, ‘to return health’, or ‘return illness to its origin away from the body’ and was used to name curing rituals and medicine. The Quechua language school categorically denied the possibility or meaning of the word in this context, informing me that my informants were wrong.

Many of the words and phrases I was taught in the school were received with great amusement and, in general, considered quaint and academic, but relatively useless for trading purposes and not suitable to enable me to buy a potato in the marketplace.

Much of my language training proper occurred in the field and marketplace, where the traders develop vocabulary and phrases specific to their trade, many of which are mixtures of words and grammar from several languages. The majority of terms used are embedded in cultural contexts that are not provided in the language school. Traders often combine words from one language with grammatical forms from another of the three predominant languages spoken: Quechua, Aymara and Spanish. Phrases can combine grammatical forms with conjugation of Spanish for mixtures of Quechua or Aymara words, or vice versa. Locating the origin of words and phrases in one particular language group becomes problematic, as does defining people's ethnicity and knowledge simply by their language. In this way, each descriptive name was located in its cultural context, and each word was treated as potentially having multiple concepts, meanings or significance depending on the context, place it was used in and the person using it.

3.2.4 Quechua and Aymara

For those with no experience of the Quechua and Aymara alphabet I provide an introduction here. Consonants in Quechua and Aymara include those pronounced normally, those pronounced with 'glottal stops', and those that are 'aspirated' forming three distinct consonants through variation of the pronunciation of the letters.

- Consonants with a glottal stop are pronounced as other consonants but with an explosive "click" at the end formed by moving the tongue up to the palate of the mouth. Glottal consonants are indicated in the text using ' (i.e. *q'uwa*)
- Aspirated consonants are formed in the throat by pushing the rear of the tongue down. Aspirated consonants are indicated in the text by an 'h' (i.e. *khoa*).

Both Quechua and Aymara use only three vowels: a, i and u. When speaking Spanish, Quechua speakers replace the letter e with letter i, and the letter o with letter u resulting in a distinct pronunciation or 'accent' for words that can become problematic.

Sheep:

owija: Quechua speaker pronunciation.

oveja: Spanish speaker pronunciation.

Although both words are spelt and pronounced differently they both have the same meaning and are understood by Quechua and Spanish speakers as sheep and not as different animals or objects.

Informants in Oruro would often note they had difficulty understanding Quechua and Aymara speakers of the same language from the north and the neighbouring country of Peru. Quechua has regional dialects in Bolivia of; Southern Quechua spoken in Oruro, Potosi Quechua with a rich lexicon, and Cochabamba Quechua which has a strong Castellano influence. Bolivian Quechua differs from the form of Quechua spoken in Peru (Albo 1987). This was taken into consideration when comparing words and names used in Oruro with studies carried out in other areas. Understanding the meaning of words in different languages requires a clear understanding of their context. The meaning of words and the context they were used in were recorded in conversation and in classification tasks to avoid duplication and to distinguish local dialects or forms of pronunciation from localised cultural contexts.

When reviewing ethnobotanic and ethnographic work on the region it was necessary to search using multiple forms or conventions used for the spelling of local names e.g. *q'uwa*, also spelt *qowa*, *q'uwa*, *koa*, *k'oa*, *k'hoa* and *khoa*. Words differentiated by pronunciation in one language may not be in another, and words often take on new interpretations or multiple meanings in different languages and care needs to be taken with literal translation so as not to incur misinterpretations or loss of cultural context.

Following a single first language and its regional dialectic form of spelling or a dictionary may be functional for studies in rural communities, however its relevance comes into question in the complex linguistic diversity found in the marketplace. The majority of the fieldwork interviews for this study were carried out in marketplaces located in urban centres and in Spanish. Most informants were first language Spanish or Quechua speakers. However, the diversity of languages spoken by stallholders alone included monolingual Spanish, bilingual first language Spanish and second language Quechua or Aymara or first language Quechua or Aymara and second language Spanish; and trilingual Spanish, Quechua and Aymara. Stallholders often pronounced

the same word with a Spanish, Quechua or Aymara accent, and changed the pronunciation appropriately to the language, accent and regional dialect of the client.

Using the different orthography and alphabet of each informant's first language would have resulted in multiple spellings for words and created an unnecessary distraction for the reader. To avoid confusion I have chosen to represent words as they were spoken in the interviews and using a single spelling throughout the thesis. Where possible I have followed the orthography for Quechua and Aymara words in omitting the letters e and o. However, I feel it is important to emphasize that a Spanish speaker would pronounce these letters when pronouncing the word. One notable exception is the word *k'oa* (spelt *q'uwa* in Aymara), which I have spelt *k'oa* as it appears in botanic and ethnobotanic literature.

For a further clarification on the alphabet, regional variations and dictionaries for Quechua see Laime (2007) 'Diccionario bilingüe Iskay simipi yuyayk'ancha: Quechua-Castellano, Castellano-Quechua', and for Aymara see IRPA (1993) *Transcripción del vocabulario de la Lengua Aymara: P. Ludovico Bertonio (1612)*'.

3.2.5 Spanish

It is worth noting that the regional form of Spanish spoken in South America is referred to as *Castellano*. Although grammatically the same as Spanish, the vocabulary in the field site of Oruro is based in an older form of Spanish than that currently spoken in Spain. The form or regional dialects of Spanish used in South America are localised with accents and phrases. These should not be understood as homogenous across the Latin American region or with all words having direct equivalents to those used in modern Spain.

3.2.6 Market survey and quantitative data

Ethnobotanical market surveys were carried out in two stages. Initially, a rapid observational survey was completed by walking through the marketplace. This was used to map and list products and trader distribution across the marketplace, providing a guide to the number and origin of traders, their produce and its form as fresh, dry or

processed. This initial reconnaissance map defined trader and stallholder social and economic groups, market size and products' commercial importance in relation to other products and the social landscape of the town. The form of groups of seller's stalls provided the initial categories of products and trader types in the market chain, as supplier, reseller, or specialist preparing mixtures. This also created an overview of the context, diversity and distribution of medicinal products between stalls and within the market as a whole.

A second stage of the survey focused specifically on medicinal plant traders and combined the purchase of plant specimens with an inventory of an individual stall stock representative of each different group of traders identified in the first rapid survey. The stall inventory recorded presence of products under the categories plant, animal, mineral, and for plants the form (whole, part, fresh, dry, processed), quantity, origin and presentation (bunch, package, herbal mixture, ritual mixture). The survey also collected basic social and economic data on traders: gender, age, first language, geographic origin; and their market role as traders: supplier/producer, reseller or merchant, specialist in plants or mixtures. Typical stalls were photographed and the layout and placement of stock within the stall recorded. While by no means exhaustive, this stage of the survey provided an overview of individual stall inventories, arrangement of products, product groups of medicinal plants and the basic structure of the medicinal plant trade in the marketplace. The brief initial conversations with traders uncovered general cultural categories of medicine, the variety of roles that traders and stallholders had, and a smattering of local knowledge about plants, illnesses, medicines and conducting business in the market.

Wherever possible, a voucher specimen of each plant traded in the market was purchased, along with a record of the common names, medical uses and preparations used by the seller. This provided a guide to the lexicon, folk classifications and categories of plants, and medicine and medicinal plant knowledge used in the marketplace. From this, a preliminary data set was compiled of plant folk names, parts used, botanical name and folk illness uses. The comparison of 1) folk botanical nomenclature and botanical identification of voucher specimens; and 2) folk illness categories and biomedical classification of illnesses, provided numerous cases of overlap or lack of correspondence that stimulated further investigation. While by no

means an exhaustive list, it highlighted cases where medicinal plant names and uses overlapped between classification structures and cases where a plant or product was situated within multiple medical categories which were noted for further analysis through semi structured interviews with selected stallholders.

3.2.7 Semi-structured and informal interviews

Due to the size of markets, with temporal and periodic markets often extending over several square kilometres, stallholders running into the thousands and the diversity of plant species typically over a hundred, key informants, plants and medicines were selected from the groups identified in the initial survey for informal semi structured interviews and participant observation. One or two stallholders were selected as representative of each group of up to ten traders for: production and supply, retailers and product specialists at annual marketplaces and four stallholders from the two central market places of Oruro city. Medicinal plants were selected to represent different ecological regions of Bolivia, and multiple uses or forms of healing in the categories of medicine and ritual healing. Semi structured interviews combined with participant observation of marketplace interactions were used to elicit specialist or expert medicinal plant knowledge and the multiple contexts of medicinal use for the plants. Stallholders were also questioned about other groups' knowledge, about the use of classifications and types of mixtures of other groups in the marketplace and if these were correct or not. This led to an understanding of how different groups interpreted their knowledge and classifications in respect to other groups, and how each was linked to local ecological diversity, inventories and medical categories.

Over one hundred hours of conversation, purchases and semi structured interview recorded in the marketplaces were transcribed and used to reference the use of plant names and cures to the contexts they were used in, by who, and to identify knowledge transfer events. The basic categories of trader knowledge were established using semi structured interviews for plant identification and naming tasks, knowledge of classification structures for plants, cures for illness of biomedical and cultural form, fright caused by unnatural cause, and types and preparation of medicines. This provided an outline of common and specialist knowledge distribution within the marketplace. With regard to the plant identification task, plant specimens were purchased in the

marketplace as fresh samples and combined with dried pressed specimens to create a portable reference collection. Plants were collected and presented in the form found in the marketplace, as wholes or as parts (e.g. leafs, seeds, dried crushed parts, compressed balls, or mixtures) replicating their appearance and context in the marketplace. These samples were used in identification tasks in local classification contexts of medicine, before botanic taxonomic classification of species was carried out. Voucher specimens were not spread out on paper sheets, but kept in balls or bags that represented their form as sold in the marketplace. This resulted in some repetition of botanic species where a single botanic species represents multiple voucher specimen of different plant parts, local varieties or forms of processing each with a specific folk name, property or use. The multiple uses for plants and mixtures were listed using the folk classification for plants and formed a folk herbarium, but not one organised by botanic species. In this way, no external systematic, cognitive or utilitarian categories for dominant biomedical or taxonomic contextual classification structures were imposed. Naming tasks also involved other plants that formed medicinal use categories or would need to be used in healing preparations and included mineral and animal products to cross reference classifications.

Interviews were not carried out exhaustively with all plants, with all traders, or even in a single sitting. The very nature of the marketplace with customers interrupting and the limited patience or attention of the stallholders did not permit this. Interviews were not paid for directly, but participants were compensated through the purchase of plants and products. This placed knowledge that was collected in the context of knowledge transmission of the marketplace and marketplace transactions between buyer and seller, and not in a sterile abstract context of a scientific institution, herbarium, medical laboratory, clinic, or in a socio-economic report void of social relations and related to external classification criteria. Traders were accustomed to these forms of external enquiry through local government surveys of population, market records to define their stock, preparation of school projects of botanical collections, and medical students, and would potentially skew results toward a single external imposed classification. Asking informants how other peoples' classifications of plants and medicine compared to theirs provided a rich source of evidence for cross-cultural classification, a pluralistic medical system and descriptions of why particular medicines were effective, the different uses of plants and rational for why plants were included in mixtures.

As mentioned above, I established relationships with traders as a client by purchasing plants and mixtures. This in turn led to a qualitative form of recording individual traders' knowledge by the history of the economic and social links I developed with them, and these enabled access to different types of knowledge. Where possible, selected informants were interviewed at several marketplaces and on different occasions. This reflected the changing context of knowledge and my changing status and identity over time. Additional participant observation was used to uncover multiple and parallel classification systems among traders and multiple forms of 'secondary' medicinal uses of plants, to include nutritional, social, hygiene and sanitation, preventative and ecological forms of illness control.

To understand how illness was defined and classified, symptoms and causes were elicited through semi-structured interviews. These enabled the classification of biomedical illness and the 'complex' of symptoms or biomedical causes related to folk categories to be recorded (see Bastien 1995). Bastien found Aymara and Quechua to use different classification structures for illnesses, based on group experience and interpretations of illness when related to biomedical explanations for inoculation. Linking the multiple biomedical illnesses into a complex or category of folk illness enabled a clearer picture to be obtained as to the diversity of biomedical illnesses an individual folk medication was being used to treat. This approach avoids problems of using biomedical illness as a gloss for folk illness categories, and the ensuing mismatch created by two distinct classification structures. This process was extended to why a particular medication was used and how different ingredients were included in mixtures. By teasing out the rationale for variations in mixtures and ingredients' inclusion or exclusion, it became possible to construct different cultural explanations of why they were efficacious. The replacement of other possible plants to use in mixtures, and explanations for their use, further clarified the criteria for illness and medicine categories.

Questions referring to how different medicines were grouped together, and how plants were selected and used in mixtures, enabled the clarification of the context for variation in classifications. These questions distinguished common illness categories of physical bodily injury (bruising and breaks), stomach problems and pain and respiratory

problems, which were the most common symptom groups and related to biomedical classification. Descriptions of illness often contained multiple possible causes of natural and unnatural origin with categories of *aire* (wind) and *susto* (fright). I proceeded to explore illness caused by biomedical and non-biomedical explanations to understand why a medicine was perceived to be efficacious and which illness episodes required multiple medications from multiple cause categories.

3.2.7 Participant observation

Lists and observational data provide two distinct forms of knowledge, that of lexical representations of knowledge as described above, and that gained through experience and not written or shared. While the first was collected through semi structured interviews, the second type of culturally-experienced knowledge was collected through extensive observation and participation as both a buyer and seller in the marketplace, and participation in the wider social sphere and cultural context in which buyers and sellers operate. This participation was recorded using standard anthropological methods: a diary, sound recording and still photos, combined with documenting using video.

Filming provided both participation and observation of both social and ritual events within and outside the marketplace. By filming ritual events it was possible to both participate and observe how my role influenced events, and record knowledge which is not only lexically-encoded, but non-verbal, such as gestures, mannerisms, colours, directions of movement and facial expressions, which are often overlooked in the event. Subsequent viewings of the filmed material enable the analysis of the events from the perspective of the different actors present or absent and to compare events in a linear fashion not possible in real time due to difference in time and space of events. The film also provided a record of what actually happened, and I was able to compare this to traders' accounts of what happened.

Participant observation and recording trading and cultural events using a video camera enabled analysis of common trading patterns used to create social identities and differentiate knowledge systems and medicinal uses not uncovered in interviews. The combination of both a structured and observational methodology enabled multiple contextual forms of knowledge to be uncovered, in this case the classifications of plants

and category of medicine. The filming of market events enabled participants' knowledge to be documented without imposing predefined categories, and record the cultural significance of different events and people's roles in events in relation to wider social categories of health. Continuity and change in social and economic circumstances, and in trader's social and economic relations, were addressed through the comparison of life histories and a review of municipal and local records of markets and trade. This provided base data related to the development of the category of medicinal plant knowledge in the marketplace in relation to the prevalent discourse of social and economic development of the region and wider national and international political and economic background of health and medicinal institutions. These included the development of the category of 'natural, traditional and artisanal medicine' regulated by the Bolivian Society of Traditional Medicinal (SOBOMETRA), and the categories of medicinal plant product in the marketplace used as 'home remedies', and in the shops and pharmacies.

Recording when different ingredients were used or excluded from a mixture provided a link to how plants and mixtures were related to illness categories, and explanations for how they promoted health for different groups. A common term, *completo* ('complete') was used by market traders and *naturistas* to describe a mixture of plants as authentic and efficacious. How *completo*, a cultural concept that is practised and not explained, can be understood as a cultural concept was explored by comparative questioning of traders. I also explored how they viewed other traders' mixtures as efficacious by the quantity, origin or quality of ingredients, or if they knew symbolic meanings, including stories or myths, related to ingredients selection and use in a mixture. These placed the contexts and narratives used to define efficaciousness of mixtures and knowledge forms into a social hierarchy of traders, and also differentiated knowledge of ability to prepare a mixture from ability to understand the significance of the ingredients or how a substitution can be made.

To understand how humoral classification varied for a plant when used alone or in a mixture, and whether an ingredient should be included in a mixture, I developed a list of possible ingredients from the purchase of mixtures from multiple sellers. The list was then used in future purchases, and once an initial mixture requested by name had been prepared, I queried whether other ingredients should be added. I repeated a purchase

with different traders at one place, and with a single trader at different times and places. The multiple purchases at different times and places enabled understanding of how multiple ingredients were replaced and interchanged in mixtures. Filming such transmission events at markets provided confirmation of how traders contextualised classifications of a mixture covering a range of broad and common illness to the specific illness of each client, and how this defined their knowledge as social status. A market stallholder of the Fermin Lopez marketplace Oruro city explained the practical context of market knowledge which is not explained or transmitted but a practice: 'They are rural peasants; of course they would not know how specialist mixtures are prepared, you have to work in the market, selling, to learn that'. These narratives also placed types of knowledge into a social hierarchy and defined groups within the marketplace.

3.3 Methodological challenges and participant observation

My participation in celebrations and ritual events provided a common experience to discuss: how an offering for good health had burnt, who had drunk the most, who had danced with who. This confidence in turn provided access to opinions, stories, beliefs and narratives about other traders. The participative approach provided an understanding of how social markers were used to identify different types of knowledge and anchor classification schemes and knowledge to social groups, and to identify the hierarchy between traders within the marketplace itself. In addition a bibliographic review of local documentation and literature including newspapers, state and municipal reports, was carried out to create a log of public and state regulations and perceptions of social and economic aspects of markets, marketplaces, health care, trade and sale of medicines and pharmaceutical products in Oruro.

The overriding methodology was not simply my participation, personal experience and observation of these events, but the contextualisation of events in the marketplace within the wider social, political and economic circumstances in which I was working and in which these experiences took place. Being an active participant in the events, traders had a vested interest in who I talked to in the marketplace. I was not simply observing or participating, but an active person, at times, perhaps, a pawn in a more complex system of which I was often only viewing a segment or single constructed context. The context in which I encountered, or was privy to, knowledge and

experiences where cultural knowledge was transmitted as rituals or stories, and the criteria used to define why other people's knowledge was inferior, showed how knowledge itself is the result of an ongoing social dialogue, contestation and negotiation.

My goal was to see the market as a knowledge system, and knowledge not simply as a consensus on which plants were medicinal and how these classifications altered between people, but why a plant was deemed not to be medicine or medicinal, and by whom, and how plants became medicinal and in what context and circumstance. The data collected did not aim for a consensus on names, uses or definitions, as the result of inventories of plant names and uses, but rather to understand variation and justification. As such, the importance of repeatedly questioning people on the same topic or naming of plants and medicines became a matter-of-fact performance. Initially, I disguised this through my poor cultural knowledge, language skills and insistence on poor memory. Later, I came to understand that contesting and challenging information was the form in which knowledge and information was validated in the social hierarchy of the marketplace; I needed to provide knowledge to receive knowledge. Making an inventory or structured interview was particularly difficult with traders; they perceived they were not gaining as much as they were giving. A large part of a trader's power lies in having knowledge you do not. Neither payment nor friendship enabled the simple task of completing a stall inventory where the trader listed plant names and uses. Requesting lists of names was further hindered by a traders' own search for information. Yet when I listed the names of the plants and uses, traders would match my knowledge with further names, or ask if I knew of a specific variety or where they came from. The more information I learnt and provided, the more information I was given.

Requesting voucher specimen identifications, with local plant names, required me to list plant names to demonstrate my knowledge, and also to understand how to contextualise the plant names I was given by the illness they cured. When I had learnt the common plant names, categories and uses, I could then discuss more names and uses I had heard from other traders. This process proceeded until I ran out of information; the traders then gave no further information. This demonstrates the need to learn, to experience, to become a specialist to access knowledge as an ongoing process.

To understand what would first appear to be conflicting classifications and a jumble of names and uses for plants requires an extensive understanding of multiple contexts, both geographic and social, which cannot be explained verbally but requires wider experiences and participation with illness and cures. My methodological objective was not to find a consensus of names or uses, but how agreement is found and information is sorted and moved and valued across a market system; the hierarchical forms it takes, the contexts it appears in, and how this is categorised and linked to different social groups and products as they pass from one place, person and context to the next.

3.3.1 PIC, keeping secrets and ethics in the marketplace

Working in markets presents a number of ethical issues surrounding informant identity and knowledge that is a 'trade secret'. Working with medicinal plants presents yet further issues surrounding intellectual property rights. Here I highlight the distinction between the marketplace and the community as a field site. Information in the community has different values to the marketplace. Knowing where a plant is available to purchase has a different value for a trader than for a user. The trader can use information of where and who to purchase plants from to add value when selling them, or to undercut others. For a buyer, however, who may know where to purchase plant material, the value of the plant is placed in learning how to prepare the plant as a medicine.

All my informants provided prior informed consent (PIC) for recording interviews, photography, filming and including their names in any published material. Nevertheless, I feel it is necessary to keep their identities anonymous and to change particular names of places, events and people to maintain a certain level of discretion, and honour their trust in me. I have chosen to do this, not by the request of my informants or the fact that their activities were illegal and they require protection, but, to the contrary, to protect them from themselves. When I was informed of a plant's medicinal uses or the malpractice and errors of other traders, this was not provided as a fact to be shared but rather to gain status. The basis of successful trade and marketing is the concealment of information. While information of names and uses for plants was to a large degree freely available, as personal relationships developed with traders, I

became aware of and partook in, events and opinions of a very private nature. In these circumstances I have used my discretion to determine the somewhat blurred boundary between personal and public information, that is to say, information I learnt through events and conversations, which were in themselves in public places, and in no way restricted, but attended by those, selectively chosen, as well as those events attended by many but not open to the public, I chose to label as private and therefore do not wish to acknowledge.

Information including places, prices and values, is not equally distributed within the marketplace and accessing information can form the basis of an individual traders' success or failure. This information, often referred to as 'trade secrets', cannot be protected by making informants' anonymous, but by the information itself not becoming public knowledge. For example, the ability of one trader to access a supply of a particular variety of plants used in ritual preparations at a public market enabled him to remain independent and successful. Competitors used complex market chains and alliances with communities and suppliers, using both social and economic ties, to access plants. Data on plant quantities and availability in marketplaces, suppliers and wholesaler distribution points are all equally important and as secret as the plant's actual uses. In other cases, information and knowledge was used as a way to give traders status over others, by knowing and having suppliers at certain markets they could define their authority or the hierarchy of their products and services over other traders. By listing origins of sources of traders their trade and monopoly is put at risk.

Intellectual property rights have been developed to protect communities against exploitation from international pharmaceutical companies, although they are often not protected against exploitation by national governments. In Bolivia, the government regulation of medicinal plant trade has led to the appropriation of its knowledge as 'indigenous'. The unique body of knowledge that develops in a marketplace such as Oruro's is not protected by IPR legislation, since markets are not recognised as an indigenous ethnic community. Individuals require protection through anthropological ethics protocols (e.g. those of ASA) against potential social discrimination, which they themselves do not foresee when they sign a prior informed consent form. Likewise, where and when does a trader's knowledge of plant use transmitted to a community become the intellectual property of that ethnic community? Or when does a trader

visiting the community become part of that community's knowledge? The marketplace as such is both within and outside wider boundaries of conventional ethnic and political communities forming a grey area for defining the boundaries of knowledge and its ownership.

Traders' knowledge of plant names and uses, ingredients and mixtures were readily available to clients who asked, but not always between traders themselves. For mixtures, the source of products can be of equal or higher importance in terms of 'secrecy' to traders, than the actual ingredients. Also, the mixture used at a specific place differs due to social demand, rendering aspects of information about mixtures' actual form only temporarily a trade secret. After a trading event, such as an annual *feria*, the dynamics of availability will alter for the following year, as will the particular value of products and the related information on their source. This information on availability is rather a strategy of trading, and does not need to be protected outside of the annual event. Information is only secret for the time it is valid for a particular trader's ability to use it to their advantage in the market. After events, traders would discuss this advantage as a strategy of trading. This in itself forms a type of knowledge, one that is shared between traders, and not between trader and client. The knowledge of trading, the practical experience from successive sales events and market places, is a knowledge that traders learn and develop, it is a knowledge that can only be learned from the long experience of trading and forms a kind of cultural knowledge encoded in the form of how to trade and the correct form of the *completo*, the complete mixture sold at markets.

Specific ingredients or quantities used in mixtures are a different form of information, which equally requires protection. Here I chose to protect this information by not providing details of exact quantities, acknowledging only a plant's presence, and the quantity in comparison to how much other sellers used. While protecting 'recipes' from external exploitation in the marketplace, the amount of an ingredient used can also become knowledge with a trade value. Mixtures are displayed for sale to the public, yet when sold ingredients are added and taken away for individual clients, and this becomes private information. This variation according to individual clients is very particular and forms another level of discretion and secrecy between the client and their trader. Here both precise ingredients and the rationale for inclusion compose the knowledge between

the actors involved. This private information requires discretion between traders. Even though it was provided in an open economic transaction of buyer and seller, it was not provided on an equal basis to all other traders and forms a sub-set of knowledge transmission.

3.4 Summary

The marketplace presents a unique location for studying medicinal plant knowledge, its transmission and its commoditisation, although it also creates methodological challenges. The methods used here follow a multidisciplinary approach with standard methodologies of ethnobotany and ethnomedicine, combined with participant observation that enables data to be placed into a cultural context. While using standard methodologies to collect data on plant names and uses, this study focused on explications for why and when different names were used. The method did not seek to compare knowledge as a list of correct names or uses, but to uncover the underlying cultural knowledge and terms and systems used to select, combine and use plants as part of a wider interregional exchange network and health system. Participant observation enables the researcher to collect data on the process of cultural knowledge transmission and the role of cultural identity to authenticate and regulate the quality, supply and efficacy of the medicinal plant trade.

Chapter 4

Setting: The Social and Cultural Context

4.1 Introduction

This chapter provides an overview of the physical, geographic, ecological and cultural setting of Bolivia and the Central Andes. This is followed by descriptions of how these factors define and characterise Bolivian medicinal plant exchange and influence perceptions of local medicinal plant knowledge in Oruro. To understand medicinal plant knowledge transmission in the marketplace of Oruro we first need to understand the multi-niche economy present in the central Andes. This requires tracing how medicinal plant knowledge is formed in an environment with an unequal distribution of resources across multiple ecosystems, ethnic groups and a pluralistic medical system. Considering the complexity and diversity of the Bolivian environment and people, this thesis does not attempt to document the total diversity of medicinal plants or ethnomedical knowledge in Bolivia, but rather to define the characteristics of medicinal plant trade and knowledge transmission within the marketplace of Oruro.

The medicinal plant pharmacopoeia available in Oruro city's marketplaces are sourced from local, regional and long distance trade routes across Bolivia's 'vertical' altitudinal, 'horizontal' latitudinal zones, and external international markets. Plant distribution patterns in Bolivia can be summarised as: across broad environmental regions limited by altitude and latitude, or from localised environmental pockets. The medicinal plant trade interacts with local subsistence, national consumption and export economy, where forms of knowledge take on different social identities and meanings at each marketplace. This places Andean medicinal plant resources in what can be best described as a multi-niche economy where different forms of medicinal plant knowledge are given different meanings and values by their social-cultural context. This chapter provides an overview of these aspects of medicinal plant knowledge and health in Oruro, Bolivia

4.2 Bolivia: population and environment

Bolivia is a resource-rich country with extensive mineral reserves and a high biological diversity. It has a poor infrastructure, is landlocked, and is one of the poorest countries in South America, with 64% of the population not bringing in enough income to meet basic needs (WHO 2007), Bolivia's territory (1,098,581 km²) extends across the central Andes and into the tropical lowlands of the humid Amazon and the dry eastern plains (Figure 1). It is a highly diverse and highly differentiated topographic and biological environment with an uneven distribution of resources. The environmental diversity of the country is reflected in the linguistic and cultural groups found there. Bolivia's territory of just over a million square kilometres has a relatively low population, currently estimated at nine million. The population is highly-dispersed in rural areas, with 67% percent living in urban areas (CIA 2010).



Figure 1. Relief map of Bolivian Republic known as 'The Plurinational State of Bolivia', and the location in the South American continent (U.S. Central Intelligence Agency CIA 1993).

The Bolivian census of 2001 registered 62% of the population as ‘indigenous people’, defined as those whose ancestors occupied the lands before 1534, when the Spanish conquerors arrived. In the census, 31% of the population identified themselves as Quechua, 25% as Aymara, 6% as Guaraní and other Amazonian ethnic minorities, while 38% did not identify themselves as any particular ethnic group.

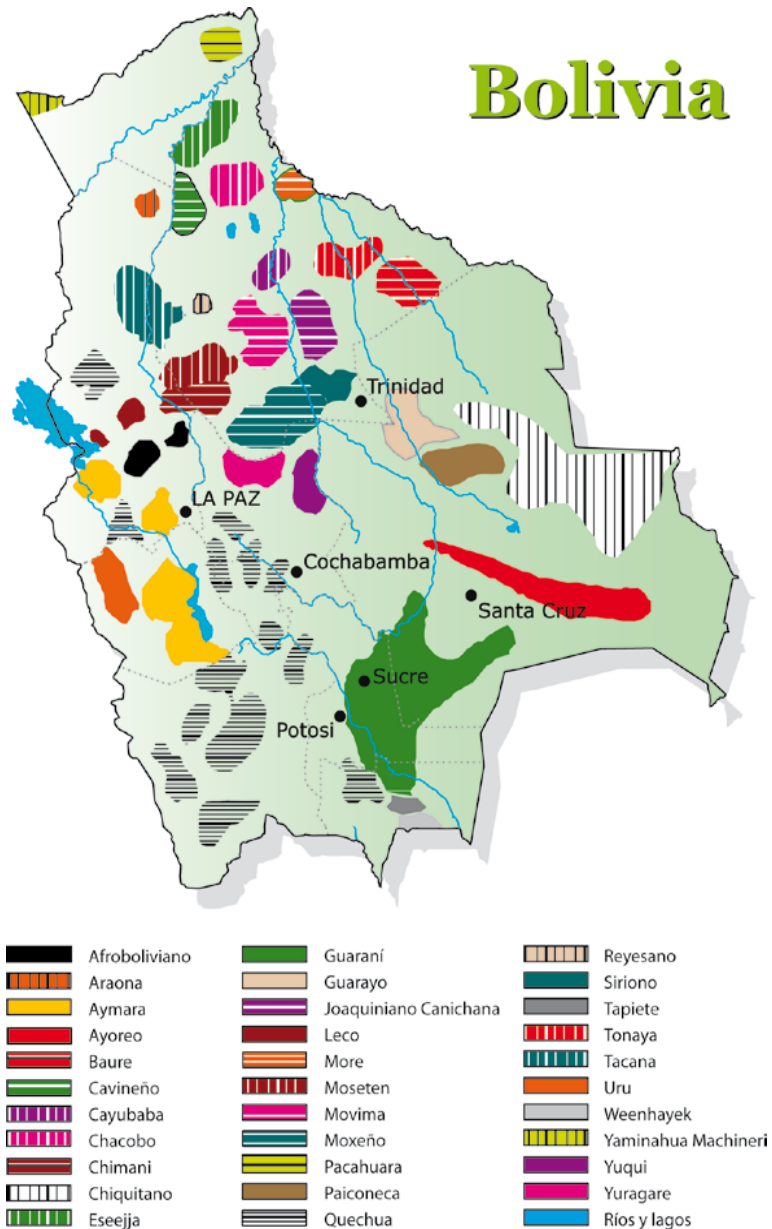


Figure 2. Ethno-linguistic map of *Pueblos Originarios de Bolivia* (Indigenous people of Bolivia) (Martín 2010).

The government recognise cultural groups of the Andean region based on their language as: Quechua, Aymara and Uru. Those cultural groups of the eastern lowlands, with smaller settlements reaching into the Amazonian basin, include communities of Chiquitanos, Guaraníes, Moxeños, Movita and Guarayo. The current Bolivian constitution recognises thirty-eight different languages, which also form the political basis for representation of the country's national ethnic and cultural diversity (see figure 2), although these 'linguistic regions' do not recognise the distinct and individual cultures of ethnic groups within the broader language groups. From my own research in the department of Oruro, I found several families and communities had replaced Aymara or adopted Quechua alongside Aymara as a first language over a single generation to extend their ability to trade with Quechua-speaking regions. The many distinct cultural groups of the high Andean region, who speak Quechua and Aymara, are not differentiated and language alone does not explain the variation in different forms of healing or regional specialisms in medicinal knowledge.

Bolivia's territory is located across the central Andes and extends to the east into the central Amazon. Bolivia lost the Pacific coastal stretch, that completes the central Andean environmental transect, to the Republic of Chile following the war of the Pacific in 1879. In Bolivia, the central Andes mountain chain reaches its highest and widest forming the proverbial 'Andean elbow'. Here, the single northern Andean chain splits as it enters Bolivia from the north to form the eastern and western cordillera that join again in the south, enclosing the extensive high plateau or Altiplano of Bolivia. With an average altitude of 3,800 metres, the Altiplano supports the world's largest high altitude population and forms the centre of the regional trade network. The Altiplano links the trade routes from the western coastal region and international ports to the eastern lowlands with the trade route between the northern and southern regions. Cities located on the cross roads of these primary trade routes, including the field site of Oruro city, are ideally situated to regulate interregional exchange (see figure 3).

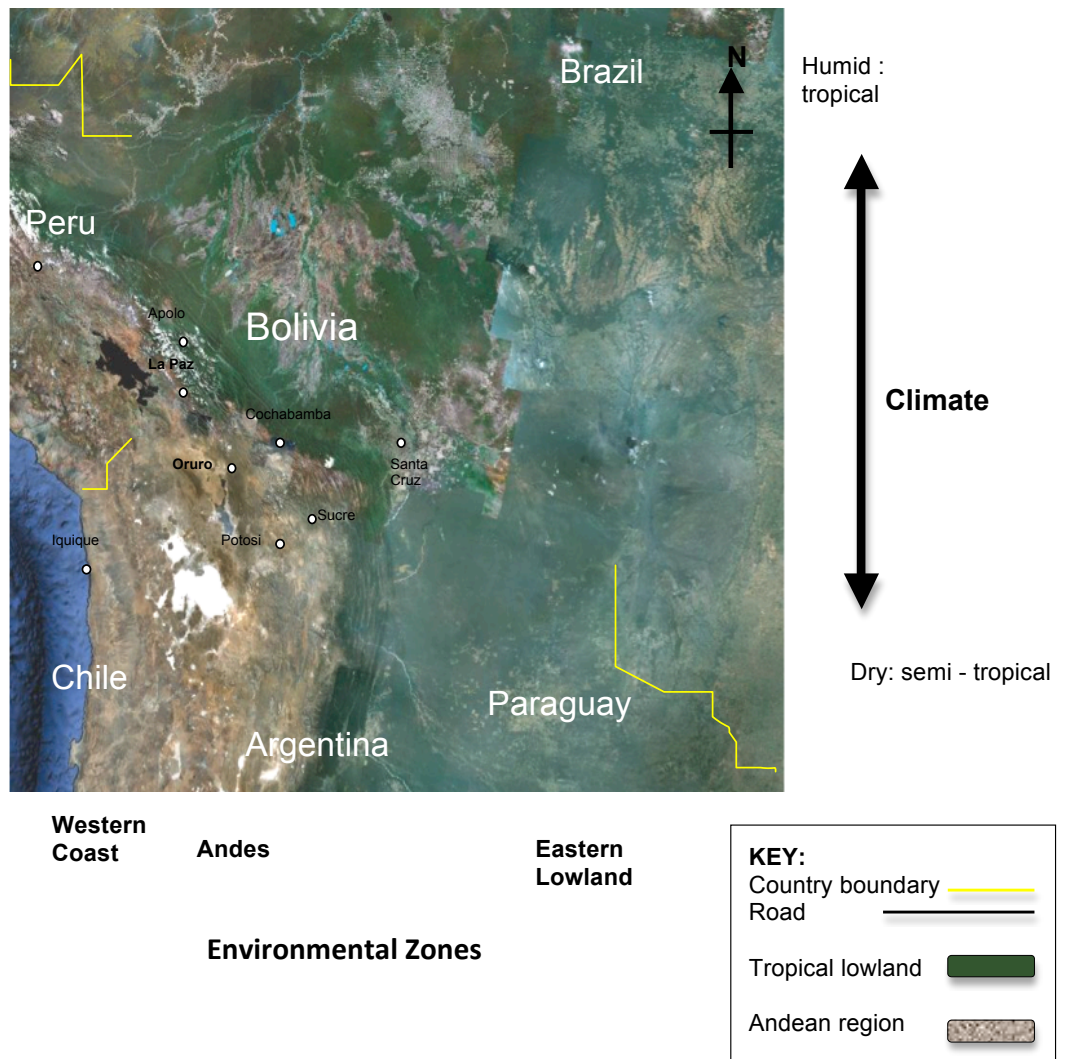


Figure 3. Ecological variation, major trade routes and Andean cities of Bolivia, geographic coordinates: 17 00 S, 65 00 W (Elaborated by Wilkin, from Google Earth 2010).

4.2.1 Health in Bolivia

Life expectancy in Bolivia is 66 years (WHO 2007). The reported causes of mortality are cardiovascular disease 40%, followed by communicable diseases (13%) and external causes (12%). The major infectious diseases of high risk in Bolivia are: 1) food or waterborne diseases, primarily bacterial diarrhoea, hepatitis A, and typhoid fever; 2) Vector borne diseases notably dengue fever, malaria, yellow fever (in lowland areas) and the water contact disease of leptospirosis (Weils disease), a zoonotic infection (WHO 2007). The country has a disproportionately high level of death within a year of

birth for the highland and rural areas caused by birthing complications and infection. Bolivia has the highest incidence of tuberculosis in Latin America and cases are more prevalent in highland and rural areas, notably around mining centres. Tetanus is a major cause of children's death in highland and rural areas caused by poor hygiene. Chagas disease, found in the warm eastern valley regions, is caused by the protozoan parasite *Trypanosoma cruzi*, and transmitted by *vinchuncas* (kissing bugs). Chagas disease produces a higher rate of D.A.L.Y. (disability-adjusted life years) than any other disease in Latin America (Bastien 2002).

The highly dispersed population, high levels of migration, high variation in regional environments and social-cultural divisions in society create challenges to providing health care in Bolivia. The Bolivian government and the World Health Organisation (WHO) regional health policy is focused on prevention of fatal diseases and has introduced initiatives to address these through campaigns for vaccination and a clean water supply. National health policies for the regulation of healthcare, medicinal plant products and inclusion of traditional healing have aimed to address the country's uneven distribution of resources, cultural beliefs in health and social divisions with the recognition of traditional healers and policies to integrate biomedical and traditional medicine. However, social, cultural and economic issues continue to dominate the uneven distribution of resources and access to healthcare in Bolivia. Close living quarters and a poorly balanced diet caused by poverty means that most of the Bolivian population are more vulnerable to illness and for those illness to be potentially fatal. High levels of mobility between ecological regions, regular visits to towns, and close contact of passengers in public transport further increase the transmission of illness within the populations. Poor levels of hygiene in street vendors of food and restaurants increase the transmission of food and water borne illness. Populations in rural and urban areas have distinct health needs and sanitation, hygiene, proximity to livestock, or working conditions and access to resources, all pose distinct regional and localised issues. These health constraints also result in localised forms of knowledge and cultural practices to prevent and regulate parasites, nutritional needs, disease vectors and treatments which cannot be automatically transposed from one environment or cultural group to another. Further cultural differences in explanatory models for causes and treatment of illness often lead to stigmatisation of certain conditions and prevent

patients from coming forward (Bastien 1995). Social divisions between patients and doctors also influence the adoption or selection of biomedical treatments.

The recent trend of migration to urban centres, coupled with population growth, has led to the rapid expansion of suburbs around urban centres, characterised by degraded environmental conditions, including poor sanitation, and overcrowding, that provide potential breeding grounds for disease. These degraded environmental conditions are combined and associated with stressed social conditions, where new migrant zones have limited access to resources through poorly developed social networks and suffer high levels of stress from the new social-cultural setting. After the initial period of migration to urban areas, migrants develop new social networks to access resources and communities to support social stress (Press 1978). Government bio-medical models and treatments favour disease prevention by improving hygiene, sanitation and nutrition programmes, together with immunisation campaigns, which are combined with prevention and treatment in state funded and centralised hospitals. Infrastructure and specialist treatment are located in urban centres and supported by temporary or mobile teams of rural non-specialist health workers.

This study found that the Andean health system incorporates a series of periodic ritual practices and seasonal events for treatment and prevention of illness. These combine the multiple contexts and functions of plants as symbolic objects to alleviate stress in a psychological role, and to lubricate social networks to enable access to resources, as well as their chemical medicinal properties in prevention and cure or ‘cleansing’ of illness and vectors of disease. The Andean health system has adapted to changing population distribution with the adoption of a market-based distribution system centred in cities that extends resources out to remote rural communities. Specialist healers previously located in rural communities are now spread across rural and urban areas. Medicinal plant knowledge is transmitted through encounters between specialist medicinal plant traders, consumers and specialists at marketplaces. Specialist medicinal plant market stallholders have become the primary source of information for healers who no longer collect plants themselves, showing a shift away from the localised and specialist knowledge held by healers to knowledge distribution through marketplaces and specialist stallholders.

4.2.2 Social and political context

The redistribution of populations into urban centres and lowland regions of Bolivia over the last three decades has led to conflict over resources and resulted in the development of political groups to represent local ethnic communities, new colonies and trade or labour movements. The most notable of these groups are the Miners Federation with headquarters in Oruro, the COB (Central Obrera de Bolivia: Central Workers of Bolivia), the Coca Growers Union that developed in the lowland valley region of Cochabamba, and the Union of Market Traders. All have made major political impacts through mass mobilisations of rural population together with organised protest. The current Bolivian president, Evo Morales, developed politically as the '*dirigente*' (leader) of the '*Cocaleros*' Coca Growers Union centred in Cochabamba, which enabled him to force a national election in 2005 following his continued campaigns of road blocking and strikes across Bolivia. The national Trade Union of market traders has significant political influence in the national politics of Bolivia. The union has representation across Bolivia, with syndicates of traders formed in each marketplace and for each sector of traders within the marketplace. The 'traditional' and 'natural' healers have political representation in Bolivia through SOBOMETRA (Bolivian society for Traditional Medicine) formed in the 1980s and who represent naturopaths, and AMTRAC (Association of Traditional Healers) who represent the *Curanderos* following Andean traditions in healing.

With the election of Evo Morales as President in 2005 the country saw indigenous religious ceremony become part of official acts. This has also created a stage for the reinvention of traditions in order to fit new concepts of indigenusness imposed by national and external perceptions and rights of the international community. The parallel existence and practice of Catholic and indigenous beliefs is shown by peoples' continuous participation in multiple religious rituals and expressions of identity. Although there is a certain amount of syncretism between Andean and Catholic religious practices, of place, time, name and the people performing them, they remain two separate belief systems. Andean beliefs incorporate multiple deities that symbolise the landscape, social divisions and other aspects of life, and remain distinct from the single Catholic God. In Oruro, as with other Andean communities, political and social

upheavals of the pre- and post-colonial past of the Aymara, Inca and Spanish Colonial and Republic governments have led to a dual leadership and social structure. The mixed civil-religious hierarchy of authorities are a result of the interface between local orders and global processes. Many forms of rural community culture in the Andes can often be traced to ancestral origins of Uru, Chipaya, Aymara and Quechua, and can be found in the local social structures and ideology of urban communities, and include distinct languages, mannerisms and ritual practices. Rural communities use their ethnicity, territorial history and rituals to define their identity on the national and international stage.

In colonial Bolivia people were grouped primarily on the basis of their ethnic origin as either indigenous 'indio' or European. The subsequent class of *mestizo*, a product of race mixing between *indio* and European, or *indio* and *criollo* (from European descent but born in the Americas) were formed during the colonial period. Spanish indoctrination and repression pushed traditional native religious practices underground. By the end of the XVIIIth century, rituals to honour saints had become the principal means by which social groups defined themselves (Abercrombie 1998). Until 2005 Bolivia's constitution stated its official language as Spanish and religion as Catholic, although the majority of the population speak indigenous languages and persist with local Andean religious beliefs, which incorporate medical pluralism. In 1825 Bolivia became a Republic liberated from Spanish rule, yet land rights, privileges and political administrative power remained with citizens who were of European or *mestizo* descent.

The agrarian reform of 1952 redistributed land rights, dividing large 'haciendas' with single owners of *mestizo* or European descent into small land holdings for *indios*. Simultaneous to these socio-political developments, racial definitions were transformed into economic activity and social classes: *campesino* replaced *indio*, and the identity of *cholo* became based on differences in urban and rural economic activity. *Campesino* became an alternative for *indio*, referring to those who live in, and come from, the *campo* or 'countryside', and as practitioners of a small-holder, subsistence-based, economy. The same person might also become a *cholo* in an urban residence, identified by form of dress, and by participation in the capitalist economy, typically as market traders. In Bolivia social divisions are also reflected in the medical preferences and

options of people. The adoption of one set of medicinal beliefs and treatments of indigenous origin or biomedical and Western origin enable access to secondary resources of political or economic benefits including land or legal representation (Crandon-Malamud 1991). The ability to trade between the rural and urban communities, through membership in multiple social institutions, requires a fluid and adaptable identity that is encompassed in the *cholo* or *chola*.

Most Andean market traders are considered *cholos*, immigrants to cities, exchanging a rural subsistence lifestyle for paid work or trade enables them to gain social status (Wallace 1991: 32). Dobkin de Rios (1992) describes the *cholo* as a well-to-do Indian, who seeks the social status of a *mestizo*, but who has not yet achieved it. He is an ambiguous person, neither a *campesino* in the eyes of other *campesinos*, nor a *mestizo* in the eyes of *mestizos*. *Cholo* is therefore an elastic category between the world of the *campesino* and *mestizo*. 'While economic and racial origin define class within this social group, lifestyles are the most important local social status determinants' (Dobkin de Rios 1992: 43). *Cholos'* approach to health and illness is dual, placing great faith in the world of plant symbolism, spiritual power and traditional healers, yet they seek store-bought medicine and maternity wards when deemed necessary (Dobkin de Rios 1992: 43). Yet *cholo* is a highly fluid social category and flexible identity for people. As social identity is not fixed but contextualised by places and actors, the same person can be presented as a rich urban *mestizo* in rural villages and a poor *campesino* in the city. However, when that same person is trading in the marketplace they transform into a *cholo*, who demands respect from both urban and rural clients and suppliers alike. The neutral identity of the *cholo* affiliated to commerce and not a producer or consumer enables a reversal of the traditional social hierarchy based on economic position, racial differences or gender divisions. The superiority of the *chola* (female trader) in the marketplace is gained by access to knowledge and products, from their role as traders and interaction with suppliers and consumers who would not normally meet. This enables them to reverse the standard gender bias in patriarchal society. Medicinal plant traders in Bolivia take on roles as itinerant traders, hold permanent stalls in central marketplaces and act as wholesale merchants and distributors. The traders also develop extensive specialised knowledge for the selection of plants and preparation of complex mixtures used in curing, healing and preventing poor health.

4.3 Oruro department and Oruro city

The political and administrative department of Oruro is situated on the Andean plateau in south-western Bolivia. The department stretches across the Altiplano (Andean plateau), described as a dry, windswept, mountain plain and reaches its limits in the western and eastern Andean mountain chains. The department of Oruro has an average altitude of 3500 to 3600 m.a.s.l, occupies 53,588 km² and represents 5% of the Bolivian territory (IGM 1997). Oruro is limited on the Altiplano to the west by the national frontier with Chile along the western mountain chain and to the east by the department of Cochabamba in the eastern mountain chain known as the Azanaques. To the south Oruro is limited on the Altiplano by the department of Potosi and to the north by the department of La Paz. The department's geography is predominantly flat with some hills and a central wetland habitat of 1000km². The western mountain chain forms a high plain or plateau 500 to 800 metres above the Altiplano and 6000 metres above the western Pacific coast, to which it abruptly descends in the west. In Oruro the western mountain chain includes Bolivia's highest mountain, the Sajama, at 6,542 m.a.s.l and the mountain passes to the western Pacific coast. The mountain pass to the central eastern valley is set directly east of Oruro city and leads to Cochabamba, the southern valley of Sucre and into the tropical central and southeastern lowlands of Santa Cruz and El Chaco.

Oruro is in the southern sub-region of semi-arid *puna* above 3,600 m.a.s.l., with shallow sandy soils of low fertility (Zeballos et al. 2003). Adaptations of flora to the cold and dry climate include reduced leaf size, resinous coatings and high content of bitter chemicals in vegetative parts to protect against frost (García and Beck 2006). Flora in the department is dominated by stands of resinous bushes known locally as *tholar* with dominant species of *Baccharis* and *Parastrephia* sp. and the hard grasses *Deyeuxia*, *Festuca* and *Poa*, and includes species of *Stipa* forming open grassland plains and steppes across the plateau, alongside the *bofedales* (fens) a seasonal wetland with cushion vegetation of *Azorella* species. The majority of herbaceous species are annual growing only in the wet season, and the genera *Parastrephia*, *Lampaya*, *Anthobryum*, and *Chersodoma* are noted among others as endemic to the region (Zeballos et al. 2003: 14).

Plant species are not evenly distributed across the department of Oruro or within eco – regions, and distribution varies according to localised conditions. Many species cross the altitudinal limit for *puna* (3,600m) and the latitude limit of humid northern *puna*. The 20,000 hectares Sajama National Park in north western Oruro has endemic *Queñua* (*Polylepis tarapacana*) forest with a unique altitudinal distribution between 4200-5200 m.a.s.l. The humid zones and fertile lower slopes of the eastern cordillera have been adapted to agriculture, while high slopes are used for grazing cattle, sheep, llama and alpaca. Edible tubers of *Solanum*, *Oxalis*, *Ullucus*, and *Tropaeolum* along with pseudo-cereals, including *Chenopodium quinoa* (quinua or quinoa) and *C. pallidicaule* (cañahua), originate in the *puna* region and are cultivated in Oruro (García and Beck 2006). Introduced crops include barley, wheat and broad beans, which are used in rotations of four to nine years with native crops by peasant farmers.

A number of plants are important sources of chemical compounds used in the local pharmacopeia and are commercialised across the Andes for their use as medicine and in healing rituals. Market inventories in Oruro city made for this study found over sixty species from Oruro to be commercialised in marketplaces for their healing properties. Southern Oruro's ecology supports endemic *lampaya* bush (*Lampaya castellani*) used locally for cleansing urinary tract and kidney infection. The prairies and meadows have dispersed vegetation dominated by grasses, the herbaceous plants of only a few centimetres high are of medicinal importance, notably species in the genera of *Gentianella*, *Baccharis*, *Azorella* and *Senecio*. Few trees are present in Oruro, although *quiñua*, native species from the genus of *Polylepis*, and *kiswara* (*Buddleja coriacea* and *B. tucumanensis*) are found growing around urban areas, and are popular medicinal remedies. High altitude vegetation above 3,800 m.a.s.l. include herbaceous species with engorged roots and small flat leaves from the genera *Nototriche* and *Werneria*, commercialised for their medical properties and use in ritual cleansing. The pungent *Sasawi* and *Popusa sp.*, found around lakes and bogs above 4,000 m.a.s.l., are abundant in the eastern mountain chain from where they are commercialised for their medicinal properties. Lichens are also used for medical purposes and I found three species that were sold in the local marketplaces.

4.3.1 Political and ethnic divisions

Oruro is subdivided into 16 political administrative provinces with 40 municipal sections. Oruro city is the departmental and administrative centre located in the north east of the department and centrally between the four geopolitical zones of the region (Condarco 1998). Of Oruro's 53,588km² territory, 38,000 km² correspond to the *Kolla* (Aymara speaking ethnic groups), 15,000 km² to the Quechua and the remainder form the habitat of the Uru ethnic groups, which include the Capillus and Muratos (Guerra 1984: 9). Adaptation to the variation in local environments led to the diversity of cultures and centres of cultural diffusion in Oruro (Guerra 1984: 10). Cultural adaptation strategies of ethnic groups in Oruro combine specialisation to local environments with specialist crops and exploitation of their position on regional and long distance trade routes. The majority of the department of Oruro and all the territory to the south and west of Oruro city has remained owned and controlled by the indigenous communities located there. As with the coexistence of the people themselves and their exchange systems, social structures and healing systems have coexisted and influenced each other, forming dynamic medical systems localised by particular environments and the histories. This dynamic knowledge is represented in the unique forms of medicinal product found in the medicinal plant marketplaces of Oruro. Through the different socio-economic historical processes of the Colonial and Republican periods, Oruro has not lost, but rather consolidated, its identity as an important ritual site of exchange and pilgrimage between ethnic groups of different horizontal, vertical, geographic and ecological Andean zones (Condarco 1998).

Mining, commerce and agriculture form the basis of Oruro's economy. Mining provides paid labour to a large percentage of Oruro's population; it forms an important part of Oruro's cultural identity, with its political economic importance contributing 30% of the GNP. Miners use offerings known as *mesas* prepared by market traders in Oruro, for protection, good health and thanks as a payment to the *Pachamama* (Mother Earth); or to ask *El Tio* (the Andean deity of all below ground and the mines) for help to find the mineral veins and to safeguard them in the mines. The composition, use, symbolism and role of *mesa* rituals for communication by miners in Oruro has been extensively documented (see Armstrong 1989). Nash (1979) highlights the importance

of these practices to unite workers and as a response to alienation in the mines. Taussig (1980) has interpreted the ritual practices as a critique of commodity fetishism. Llama and Quinoa have become important export products from the agricultural sector of Oruro in recent decades. The marketplaces and trade routes of Oruro facilitate the exchanges between people from the eastern Pacific coast, the Amazon, the western lowlands, the northern and southern regions of the Andes and South America. The traditional trade routes and present road networks link Oruro directly to Bolivia's capital la Paz. The eastern valley trade routes lead to the centres and towns of Cochabamba and Sucre, which link the Altiplano to the eastern lowlands and savannas. Cochabamba has been the centre of maize production for national consumption and export since Inca times and Oruro remains the centre of distribution for the maize. The western routes, which cross the Altiplano, passing Bolivia's highest mountain the Sajama, link Oruro directly to the Pacific coastal ports of Chile.

The population of Oruro is estimated at 392,000 by the National Institute of Statistics, (INE 2001). 60% of the department's population live in the city, internal growth and immigration from rural areas having led to a constant increase in population and ongoing expansion of the city residential zones over the last three decades. Migration is fuelled by opportunities of paid labour, access to housing and economic opportunities in the development of 'open' marketplaces in urban areas, and an unstable political environment. The dynamics of the population are influenced by a constant internal migration from rural to urban centres and then to Oruro city and out-migration estimated at 10% to the Andean cities of El Alto and La Paz, lowland regions and cities of Cochabamba and Santa Cruz. Waves of migration follow trends in labour and economic opportunities in the city, country and further afield. Fluctuations in prices of metals on international markets define the corresponding demand for mine labour and supporting industries and basis of the city's economy. Out-migration to the central eastern lowlands ecological frontier in the Chapare region of Cochabamba has seen the development of migrant communities and coca plantations since the 1980s. Some groups of migrants from rural communities and families in the city have extended cultural and trade networks through migration to Argentina, Chile, USA and Spain. These migrant communities enable extension of Bolivian and Oruro's identity through rituals and create new markets for medicinal plant mixtures and ritual offerings. The

wave of immigration from rural areas since the 1980s has been combined with the increase in marketplaces and free trade. Rural migrants' employment opportunities are limited by lack of formal education, and they often take on roles as merchants and distributors, forming market syndicates to monopolise trade and access market space. Migrant communities establish social networks that combine their community ties with urban ones through participation in urban institutions and market syndicates or unions.

Medicinal plants are not cultivated in the Altiplano or Oruro, but form a supplementary income for subsistence farmers. Specialist traders of medicinal plants are both itinerant and permanent market stallholders in established marketplaces. These medicinal specialists offer a diverse range of plant species from across Bolivia and mixtures of these with minerals and animal products in the marketplaces of Oruro city and rural towns exploiting the variation in distribution of resources and niche markets for culturally defined medicinal products. The people and communities' interrelation with national and international markets, and a monopoly on informal trade, demonstrates that they are far from impoverished peasants exploited by the state for labour. Nash's (1979) study of mine worker communities in Oruro during the 1970s, found that they were 'savvy peasants' aware of their products' importance in international markets (Nash 1979). The communities are well aware of the importance of identity and use rituals to unite ethnic and social differences, and political unions to negotiate working benefits against the state (ibid). The multiple union marches and political alliances of mine workers and traders for better conditions have consistently demonstrated their ability to define themselves against the state, and underlining the importance of using ritual offerings to unite social groups under a common identity of community or trade to negotiate with the state and international institutions and markets.

4.3.2 Oruro city

Oruro city is a multi-cultural and cosmopolitan city. 52% of the city's residents are monolingual Spanish speakers. The majority of migrants to the city are bilingual, speaking Spanish with a mother language of Quechua or Aymara, and a small percentage are trilingual. There are also a small number of bilingual speakers of the

Uru language group from communities around Lake Poopo just outside the city¹. In addition to native languages, the city's international communities include the European languages of German, English and French, a group of Arabic speakers and some Chinese families. People living in the city consider themselves Orureños and Bolivian, forming part of a national identity. The social and ethnic classes of *campesino* (peasant), indigenous, *mestizo*, *chola* and Spanish or elite, relate to people's economic status, and the zone of the city they live in.

The majority of the city's population, irrespective of social class, religion or culture, participate in the important folk traditions of *La Ch'alla*, pouring libations of alcohol to the *Pachamama* 'mother earth', and *K'oa*, burning a mixture of plants and symbolic objects in offering for *Pachamama* during carnival. Rural communities, businesses and mine companies also perform rituals of *wilancha* (ritual and communal feast characterised by the slaughter of llama) for *Pachamama*, *Inti tata* (sun grandfather) and adoration of local deities represented in the landscape. A man purchasing a *mesa* mixture to use as an offering to *Pachamama* from Oruro's central marketplace, the Fermin Lopez market, clarified the syncretism of religious beliefs in Oruro to me. When I enquired why he was buying the *mesa* he proudly replied: 'We are Catholic, that is why we give offerings to the *Pachamama*, the mother earth.' For Andeans, the existence of a single Catholic God is combined with earth spirits to explain their relationship with the environment and other social systems of the state and community they interact with. What is important for people in Oruro when they describe themselves as Catholic, is that they are 'good' and are not using the mixture or performing the ritual to cause harm to people.

Oruro city is divided into four administrative districts each with marketplaces for redistribution of resources (see figure 4 below). The central district follows the boundary of the colonial Spanish city, and the northern, eastern, and southern districts extend from the central district and have developed over the last century. The central district extends over eight blocks following the architectural regulations for colonial cities in the new world. The four incoming roads are wider and lead directly to the

¹ The national census (2001) reports that 45% are bilingual in different combinations of these languages: Quechua only 1.3% (2,491); Quechua and Spanish 30% (59,000); Aymara only 0.23% (486); Aymara and Spanish 13% (26,000) and Aymara and Quechua 2.2% (4,000).

city's central plaza, where the central banks, municipal offices and police headquarters are located. The outer blocks are housing for the more affluent population of office workers, administrators and executives. The southern, eastern and northern districts are residential areas with small industrial plants. The southern, eastern and northern districts were planned and built during the mid twentieth century. The architectural style of the zones follows that of the period with long residential blocks compared to the short 100m metre blocks of the central zone. Each district has an enclosed marketplace and a weekly market known as the *feria*. The marketplace forms a point of interaction between rural migrant communities in the zone and the urban consumers. The social and political organisation in Oruro city is based on a system of *Junta de Vecinos* (neighbourhood councils), which represent the different districts and people to the municipal authorities.

Oruro city has six permanent enclosed marketplaces that are open daily, a system of weekly *feria* markets held in rotation through the days of the week at each of the permanent marketplaces, two annual *feria* (one in the northern zone and one in the southern zone), and an annual trade exhibition EXPOTECO (Exposición Técnica, Económica, Cultural y Comercial de Oruro) (see figure 4). Within each permanent marketplace, traders are grouped into different sectors based on the products they sell, which include sectors for medicinal plants or home remedies. The city centre has the two oldest enclosed marketplaces, the Fermin Lopez market and the Campero market, established in the 1920s. The Campero market is located on the boundary between the central commercial zone of the city centre and the outer eastern residential zone. The roads leading from the Campero market form an open street market renowned for the sale of fresh herbs by local rural communities. The four outer districts of Oruro city (south, east, north and southeast) each have an enclosed marketplace built in the 1980s. The annual market of Oruro city is held in the northern district lasting over a week and drawing in thousands of stalls and traders who extend over four-square kilometres. The annual market is administered by the local neighbourhood council, the union of market traders in Oruro, and regulated by the municipal officers for marketplaces who mark pitches and collect rent. EXPOTECO, the annual trade exhibition, is held on the University Campus and requires registration as a business with a fixed address along with significant administrative work and economic outlay to secure a stall.

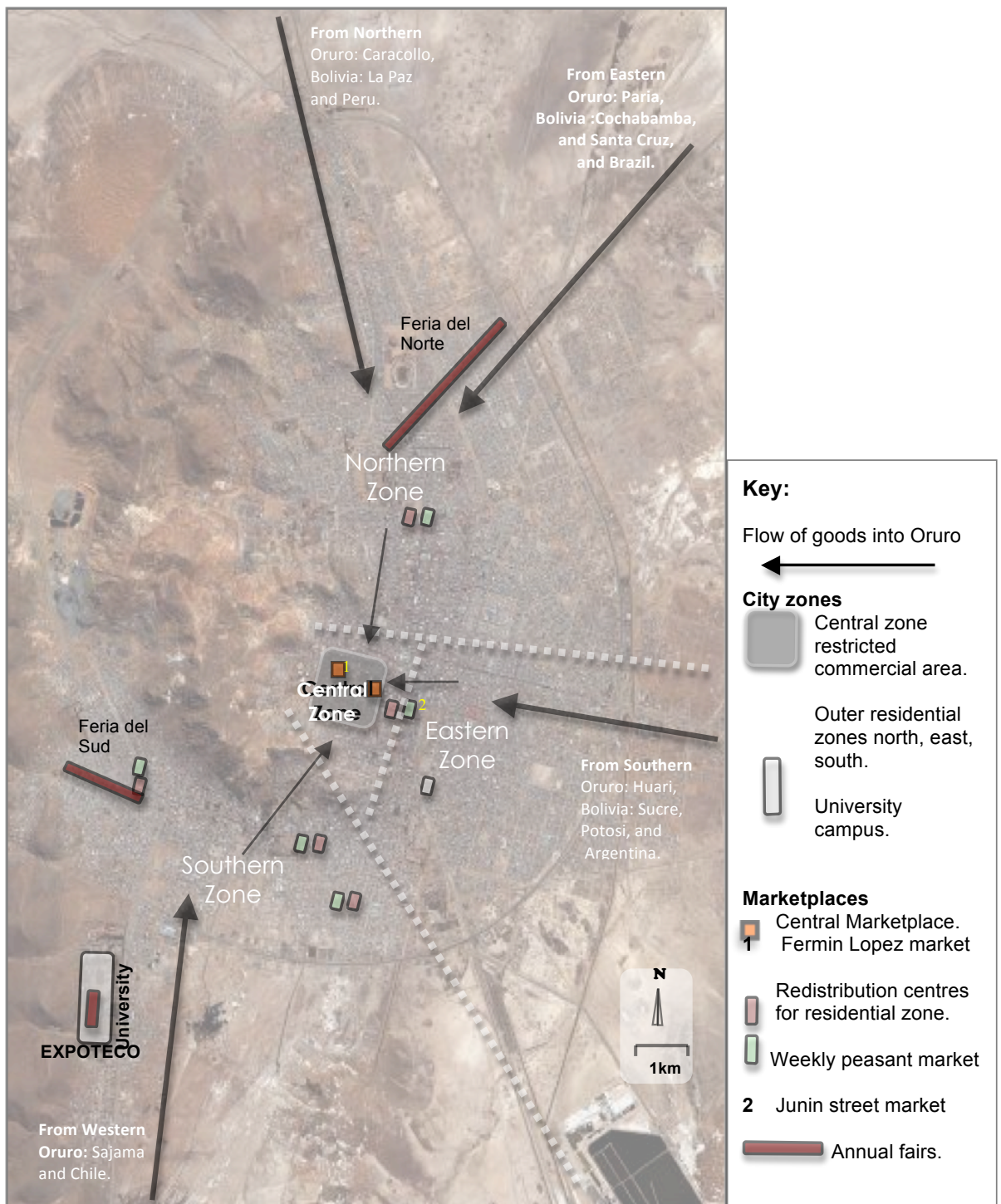


Figure 4: Plan of Oruro city showing residential zones, marketplaces and movement of trade into the city (elaborated by author from a Google satellite image 2010).

4.3.3 Constraints to health and access to facilities in Oruro

The department of Oruro is sparsely populated and the remoteness of its communities, its social divisions and poverty, all influence treatment and incidence of illness. Close living quarters and a poorly balanced diet, mean most of the population are susceptible to infectious diseases. The distribution of health care facilities in Oruro is influenced and defined by population density. In the rural area, the low density and widely dispersed population results in limited or temporary service with only basic medical facilities. Specialist medical services, professionals and intensive care of hospital facilities are centralised in Oruro city, and provided by both state and non-governmental organisations in both newly developed sectors of the city and to economically or socially restricted areas and groups. In urban areas, cultural (Bastien 1992, 1995) and structural barriers (Greene 2004) restrict access and adoption of biomedical treatments. In Oruro most of the population combine biomedicine or western medicine with Andean forms of healing, and accept Andean and biomedical models and explanations for illness and treatment. From my own experience with people in Oruro, cultural and social dimensions do restrict access and adoption of different health facilities, and follow the patterns described by Greene (2004) for La Paz and Bastien (1995) for Quechua and Aymara speaking communities in Oruro and Cochabamba.

Bastien's (1995) cross-cultural study of tetanus vaccination, involving Aymara communities in Oruro, Quechua of Cochabamba and Tupi-Guaraní of Sucre, found that illness is perceived within both a magical and biological framework. Bastien found that there was no specific name for tetanus in Quechua or Aymara, but that it formed part of a complex of illnesses with a common causes of *wayra* (wind) or *aire* entering the body, *susto* (fright) causing the patient to lose *ánimo*, and sorcery. Greene's (2004) study of Aymara speaking residents in La Paz city, found structural barriers to be more important than cultural difference for non-adherence to tuberculosis treatments. While informants had a variety of beliefs and practices related to medicine, the majority were comfortable with the biomedical model of tuberculosis and belief in efficacy of anti-tuberculosis chemotherapy. Hidden costs for treatment, poor access to care, ethnic discrimination and prior mistreatment by the health system were overwhelmingly cited as reasons for not completing treatment. The author concluded that social dimensions of health care delivery can explain non-adherence in marginalised populations, rather than cultural difference. I would also consider the high rate of mobility of the

population, temporary migration and poor adherence to formal time scales outside communal ritual systems, to be driving factors of non-adherence in Oruro.

The primary detrimental environmental factors to health in Oruro are poor working or living conditions and diet. Poor sanitation, unhygienic or contaminated food outlets, cold and damp living quarters all cause and transmit digestive tract, urinary tract and respiratory infections which, if not treated, can lead to more severe illness and death. Mining centres have been linked to the high incidence of tuberculosis, and respiratory illness (personal communication with departmental health personnel). Migrant communities that develop around the mines and provide labour and services to their families often have inadequate sanitation facilities. They depend on cultural models of hygiene adapted to rural areas, such as not using indoor toilets that are ill-adapted to highly concentrated populations and living conditions. The outer and more recently developed urban communities of Oruro city also suffer from dust with unpaved roads as a result of the clearance of surrounding vegetation. This aggravates respiratory illness, and inadequate sanitary facilities with open sewage and wastewater channels form centres of infection.

The industrial sector located in Oruro city is also poorly regulated, further reducing air quality to outer zones of the city. It is considered by residents that the burning and release of toxins from factories producing soap, washing powder and other domestic products, along with the metal works and foundries, are a cause of ill health for adjacent residential zones. Newspapers report cases of lung infection, although no official data are available. Unchecked mine discharge and runoff potentially cause a high incidence of heavy metals in water supplies, and mining activity creates pollution with a high incidence of air borne particles, although again little data is available to confirm the detrimental effects to health. Oruro's role as a trading centre provides both a highly diverse diet and potential of disease from untreated food; fruit brought from the valley is considered to be a major source of typhoid. The flow of traders into the city and merchants travelling out from Oruro creates vulnerability and a high potential for transmission of infectious disease. A patient's ability to access dietary resources and medical treatment influence their ability to recover, and social networks to access resources must be taken into account when considering the dynamics of urban residents' health.

Good health in Oruro is socially-determined and a result of access to food, hygiene, a clean environment, medical facilities including alternative medicine and plants for curing and specialist biomedical facilities for treatment, including dental care and hospitals. Access to facilities is defined by social networks, that provide knowledge of where and who is able to supply and provide clean food and reliable medical facilities, including ritual offerings and herbal remedies that are culturally appropriate. Establishing client relations with marketplace traders, and knowledge of who has the best quality of produce when and where, all form part of urban social economic strategies. The city centre has a clear sky and good quality of living for those able to rise above the pollution, obtain a clean water supply, sanitary facilities and access to the high diversity of nutritious fresh food. In particular, maize, natural products and fresh fruit from the valley, imports from abroad and locally-produced highly nutritious chenopod cereals, meat from cattle, llama and sheep, all considered a regional delicacy, draw buyers from across the country. Likewise, the availability of international health specialists, state health care, and specialists in Andean, 'natural' and biomedical models of healing, make Oruro an important centre for pluri-cultural health care .

As a culturally diverse centre, Oruro's cultural, social and economic features create a diverse set of health needs and socially determined treatments, creating a multi-niche economy of specialist health products and healers. Health products in Oruro are a result of local social, economic, environmental conditions and international aid systems. The constraints to health and lifestyle have also determined people's adaptation patterns. Hitherto, the use of medicinal plants in the Andean medicinal system has largely been studied from the perspective of cures and not as part of wider socio-economic or cultural strategies for prevention and regulation of disease. The high prevalence of infectious and air-borne illnesses and parasites from food are not easily dealt with through the national health system, with the exception of campaigns for clean water and washing hands before eating. These cultural models of disease prevention are often not appropriate to the reality of many people's lives. Further, the official focus on diseases which cause death, and not access to facilities, poor diet and prevention of common illness and parasites, skews the health provision and leaves a set of illnesses which only natural or alternative health care in social, economic and culturally appropriate forms, can address. People's continual interaction with sources of contaminated food and an

unclean environment has led to the adoption and incorporation of Andean medical plant remedies used in periodic body and environment cleansing rituals.

The Andean medical model present in Oruro incorporates five types of biological treatment and cultural contexts for medicinal plants: 1) prevention through use of plants as insecticides against vectors or viral illness in the air, through burning; 2) prevention and cure through the selection of varieties of characteristic plant species for use in daily diet; 3) medical treatments of natural ingredients internally and topically²; and 4) Andean ritual offerings used to regulate access and redistribution of resources within social groups, to enable a healthy diet and 5) to treat and prevent illness of psychosomatic origin.

4.4 A brief history of exchange, social identity and medicinal plants in the central Andes.

In Oruro, territorial limits, sacred sites and history are used to create ethnic identities that continue to define communities' cultural identity in a national and global dialogue (Abercrombie 1998; McNeish 2002). Tracing the development of social groups and traders in Oruro enables a better understanding of how traders use their identity to commoditise medicinal plant products. The history of the central Andes can be divided into three broad periods: 1) the pre Hispanic period with the development of kingdoms and states, reaching their apex in the Inca realm; 2) the Colonial period 1532 until 1782; and 3) the Republican period, comprising the early national and the modern period. Each period has shaped the current identity and perceptions of the traders, and the categories of medicinal plant knowledge, transmission and products found in the medicinal plant marketplaces of Oruro.

The pre-colonial era saw the specialised adaptation to local environments by local ethnic groups, and the development of complex exchange networks embedded in social and economic systems of the dominant state. The period also saw the development of

² The use of internal and topical medicine has incorporated traditional cleansing, using baths and washes periodically during the year, and the recent promotion and adoption of annual consumption of mixtures of plants at the annual *feria* to cleanse illnesses such as urinary tract and kidney infections or stones and parasites such as worms.

the Andean health system and knowledge of prevention, cure, nutrition and resource redistribution through a complex socio-cultural system based on the performance of rituals, and a communal hierarchy with regional specialisation within the dominant state of the Inca realm³.

The Colonial period developed social categories based on racial origin and medicinal products took on social identities related to these classes, including the development of the *mestizo* class of traders known as *cholo*, trading between rural and urban spheres. In the Republic, the socially elaborated racial divisions were overlaid with social divisions based in economic status and economic classes of rural production, trade or labour and an administrative elite, each with their own traditional medicinal plants, practices, rituals and processed medical products. The recent development of ethnic identity in rural communities and urban centres, which interact with national and international markets, has created a complex diversity of identities for medicinal products represented by the modern pluralistic medicinal system of Bolivia. For an analysis of how indigeneity appears in the local and national arena, what it means to be indigenous in contemporary Bolivia, and why villagers reject this term see Canessa's 2012 study of a highland Bolivian Aymara village.

The development of the Aymara, and the spread of the Inca across the Andean region, as described by cultural historians, often results in contradictory and confusing explanations of the origin of many beliefs, customs and social arrangements. This is, in part, due to the migration of people in the period leading up to the spread of the Inca, and the elimination and movement of entire ethnic groups and communities by the Inca. The process of migration and movement continued through the colonial period, with people moving to new communities and into urban centres, and this continues today. As well as this constant movement of people across the Andes, each culture adopted and diffused customs, social systems and beliefs from previous and conquered people as well as introducing their own. In this complex and constantly changing intercultural landscape it is possible to identify more clearly the adoption, appropriation, use or

³ Social organisation and exchange in the pre-colonial period, is described in Rostworowski's (1999) 'History of the Inca Realm'. I have followed Rostworowski in omitting the term *empire* to describe the *Tahuantinsuyu* (Quechua four 'the four united regions'), and prefer the term *Realm*, since the cultural meaning of empire 'does not interpret or correspond to the Andean reality but is relevant to situations on other continents' (Rostworowski 1999: X).

diffusion of certain ideas or ways of life by different people. This has led to two forms of ‘traditional’ knowledge and practices, one sometimes referred to as the ‘Andean cosmovisión’ due to its widespread acceptance but unclear origin, the second, specific practices of ethnic groups or people who claim to be the origin of specific knowledge or practices.

The general concept of ‘Andean cosmovisión’ has led to an oversimplification of the diversity of local specialist forms of medicinal plant knowledge and the competition between different ethnic groups in Bolivia who claim to have originated certain specialist healing practices (for a reference to the Aymara cosmovisión see Van Kessel 1996). The Andean system is rather a set of specialist forms of knowledge that result from the way different groups have adapted to variations in the Andean environment and itself can only be understood as an amalgamation of local specialisations and not a singular homogeneous system stemming from a single group. These Andean cultural traits have developed as an understanding of people’s relationship to the diversity of environmental regions, social constraints, and multiple exchange systems. This has produced a localised dynamic form of Andean culture and knowledge represented as medicinal products in Oruro and in Oruro city. These forms of traditional ethnic knowledge have also interacted with social class to form distinct categories of medicinal plant traders, and products, who each trace their roots to particular places and histories.

4.4.1 Pre-colonial development, ethnic groups and exchange in Bolivia

The first inhabitants of the southern Andes and Oruro were the Uru ethnic groups who extended from the western coast across the Andean plateau, the eastern mountain chain and into the eastern valleys (Condarco 1998). The Uru culture combined hunting aquatic wildlife with herding of llama and farming Andean pseudo cereal crops including varieties of *quinoa* (*Chenopodiaceae* spp.), *amaranto* (*Amaranthus* spp.) and root crops of *papa* (potato) (*Solanaceae* spp.). The Tiwanaku culture expanded from its centre in La Paz, northern Bolivia, between 700 and 1100 AC and incorporated the Uru. Tiwanaku developed a state organisation and interacted with its northern counterpart, the Wari culture, although these were two distinct political and economic systems (Griffin and Stanish 2007).

After the decline of the kingdom of Tiwanaku, the Aymara settlements and kingdoms spread southwards into the western Altiplano, across the dry plains and high mountains, the Uru territory was reduced to the central wetlands with nucleus settlements on and around the lakes. The Aymara became the dominant culture on the Altiplano and adapted pastoral and agricultural strategies to the ecological variations of the Andean region from the western coast, across the central *puna*, the *yungas* (subtropical valleys) and eastern lowlands. The central Andean territory was formed and divided into distinct autonomous, ethnic groups referred to as *ayllu* that were linked linguistically and stemmed culturally from the ethnic group known as the *Colla*. Each *ayllu* distinguished itself by its distinct 'Aymara' dialect, dress, music, weaving, and local rituals and deities', creating a form of localised regional cultural variation under the umbrella of a central Aymara cultural ideology, belief and language (Larson 1998: 21).

The social political ties of the Aymara *ayllu* linked the central settlements in the high pastures, across the *puna* with those often several days journey away by foot in the eastern valley and western coast, enabling access to resources across the different vertical environments of the Andes. Discontinuous land holdings of *ayllus* were not only distributed over the vertical ecological tiers, but were also inter-dispersed with the fields of other *ayllu* within a single microclimate. One advantage was minimising risks with families accessing different kinds of soil and crops in a horizontal microclimate. Beyond kin relations, Murra (1975) emphasised the social relations and a 'world view' ideology of production and exchange, which in practice binds people, through communal traditions of social obligation, reciprocity and communal labour (Larson 1998: 20).

The Inca expanded from highland Peru combining a socioeconomic, political, administrative and religious system with a network that linked urban settlements, sanctuaries, temples, *tambos* (inns and trading post), storehouses and roads to Cusco, as the geographic and cultural centre. The Inca differentiated the central Andean region of Bolivia based on ecological variation into the Andean region of the *colla*, formed of Aymara and Uru ethnic groups, and the tropical lowland region of the *chunchos*, formed of multiple tribes and kingdoms. The Inca realm of *Tahuantinsuyu* (the four quarters) (1438 to 1525) encompassed the entire Andean region from Colombia to Argentina and stretched into the eastern Amazon and jungle region of the Mojo (Wilson 1999: 404-7).

Under the reign of El Inca ‘Pachakuti’ (1438-1471), the Inca incorporated the southern Andean region of Bolivia and the Aymara and Uru area as an extension to the already existent Inca *Collasuyo* region (Gisbert 1988: 81 in Rist 2002: 117). The highland regions were further divided based on their previous kingdoms and retained their ethnic identities, highland centres and received titles for land spread across the vertical axis of the Andean environments.

While the Aymara kingdoms formed parallel strips across the vertical ecological regions of the Andes, with the political and population centres in the Altiplano, the Inca placed their ideological and territorial centre in Cusco, Peru, as the centre of political, religious authority and culture. This enabled the realm to be expanded and new territory added and embedded into the existing structure. This aspect of expansion enabled the continual addition and integration of wider and established trade networks into the Inca system, the Aymara *ayllu* forming self-contained systems within the network. Abercrombie (1998) emphasizes the Inca organisation as a form of localising redistribution of resources from each ‘point’ within the Inca realm. Cusco and other towns or settlement areas were divided by their geographical and ecological differences and their administration and ritual centres formed a miniature of the larger scale. The Inca system of social organisation for obligations (religious, economic and labour) incorporated the individual into sequential levels of political hierarchy and environmental distance, represented in rituals.

Under the Inca, socioeconomic organisation was formed by reciprocal relations that ‘regulated the provision of services at various levels and served to interlock the production and distribution of goods’ (Rostworowski 1999: 37). When the Spanish arrived in 1525, they found no large marketplaces, as in Mexico and Central America, for the distribution of subsistence. Instead, specialist or luxury and surplus products, including the fine cloth from ‘industrialised’ weaving houses or maize and agricultural stock, were held in Inca state-owned granaries and storehouses such as those of Inca site of Paria, 15km from the city of Oruro, Oruro, Bolivia, from where they were redistributed (Larson 1998: 31). Early historic records mention Paria as one of the most important provincial settlements in the Inka state. The actual Inca site of Paria, referred to as Paria La India or Paria La Vieja (the old Paria), was only recently discovered outside Oruro city with an extension of 100 hectares, 1,000 silos and various

foundations for huge administrative buildings. The current town of Paria, Nuevo Paria (new Paria), was the first Spanish village founded in the Southern Tawantinsuyuv now Bolivia, by order of Diego Almagaro in 1535, north of the Inka site of Paria (Pärssinen et al. 2010).

Exchange and resource distribution fell into two spheres; 1) resources distributed across the vertical variation of the Andes controlled by each *ayllu* and 2) exchange between each *ayllu* and external resources of other *ayllu*, lowland tribes and the Inca state. The fundamental form of knowledge transmission and exchange for the Inca were ritual performance and offerings. Representatives from each *ayllu* lived in the Inca capital of Cusco where they learnt the rituals before returning to perform these in their *ayllu*. The ritual performance continues today and combines annual election of communal authorities, distribution of lands within the *ayllu* and mnemonic systems to relate the relationship of the community to the environment and other *ayllu* through oral recital and offerings of products produced and exchanged by the *ayllu*. The ritual offerings are required to have products from the vertical ecological levels of the *ayllu*, and products that are exchanged in the wider networks outside the *ayllu*, from cities, or other ecological regions and labour. The oral recital used in the rituals recalls environmental features and territorial limits while feasting provides opportunities to share communal values with embedded cultural importance. The Inca system of the performance of rituals creates an ongoing system of cultural transmission that is both localised and embedded in wider spheres of social order, resource distribution and ethnobiological knowledge.

4.4.2 Colonial identity: cities, traders and marketplaces

Following the Spanish discovery of South America in 1532, the Inca Realm was progressively replaced by the Spanish colonial system, with the development of rural towns, urban centres, and movement into market exchange systems. Medicinal plants took on new social identities and uses as medicine and in Andean and Catholic rituals, forming commodities with different values in the Andean communities and Spanish urban centres. The colonial period marked the beginning of social divisions overlaid onto racial categories of *indio* peasant producers, *mestizo* mixed race, the *criollo* of foreign parents but born in the Americas, and colonial Spanish from Spain forming the

ruling elite. Inca nobility retained titles and lands, a higher social status and rights, while the lowland tribes referred to as *chunchos* by the Inca, remained regarded in general as uncivilised savages. The Spanish state and religious institutions regulated the distribution of products in urban areas and imports from international trade. Indigenous communities retained land titles in highland and lowland areas following those of the *ayllu* designated by the Inca and paid taxes and labour draft for mining to the Spanish crown. The Spanish also set up *encomienda* territory with Spanish lords, who owned the people, products and resources, and were responsible for the wellbeing and religious instruction of the population, and paid taxes to the crown. Capitalism interacted with previous patterns of economic life rather than supplanting them, and by the seventeenth century the majority of the population of the Andes "combine[d] remunerated labor with community agriculture" (Zulawski 1995: 61, in Boeger 1996). Much of the trade and distribution of natural products remained in the hands of indigenous communities and independent traders.

The colonial period introduced a new set of categories, values and regulations for medicinal products and healing, based on Catholic religious doctrine and European theory of allopathic explanations of disease, illness and medicine. For the Spanish, healing was thought to be a result of devotion to the single Catholic God and not to multiple pagan spirits that occupied the landscape. Official medicinal plants were prepared and distributed from the *botica* (apothecary) and illnesses were diagnosed by Western trained personnel. The use of unknown plants, ritualised forms of preparation or application, in particular burning or burying, or the invocation of non-Catholic names to aid healing, all constituted witchcraft. Andean healers were classified as herbalists or *brujos* (witches). Hospitals were established across the central Andes and doctors' medicinal needs were supplied by the *botica*, forming the two institutions 'Medicine' and 'Botica' as an externally regulated hierarchy and professional status. Preparation of medicine, a specialist role in the hands of the *boticario*, was directed by the *médic*. The Andean health system and the diversity of the regional and ethnic system, with distinctions of specialist healers, were reduced to a single category of 'Andean'. Andean healers collected and prepared medicine and mixtures or sought out herbs from the local marketplaces, with traders forming two institutions, one of specialist healers and the other of market traders specialising in the supply and preparation of medicine and medicinal mixtures.

The rural marketplace provided distribution points and internal exchange between communities, with opportunities for communal-based traders, while the interaction between rural communities and the Spanish provided space for wholesale merchants who acted as go-betweens for rural communities and on long-distance trade routes. The *mestizo cholos* combined aspects of both languages and cultural forms of exchange, and established large *tambo* trading houses located in urban centres. The *chola* took on the social identity of urban dwellers with distinct categories based on the economic status of producer, market trader or upper class, and regional styles of clothing of hats, blouse and skirt for the political regions of cities they came from (Paredes-Candia 1992). In Oruro, the newly enriched *mestizo* merchants and mine owners were given residence in the northern sector of the city along with other specialist professions. Their social class of *mestizo* was defined by their clothing, language and lifestyle, rather than being a hereditary line. The urban merchant *mestizos* were based in colonial institutions on which they relied for their access to space in urban areas to trade and to access clientele, but needed an understanding of rural communities' language and trading customs. Traders from each city had distinct hats, skirts and dress style that defined their identity. The informal traders of non-specific items in the marketplaces who traded an assortment of products between the rural and urban markets were known as *chiflera*.

4.4.3 The birth of a republican and national identity

Independence from Spanish colonial rule in South America saw the creation of the Andean states and formation of a national identity for Bolivia in 1825. The formation of the Andean nations created what Rivera Cusicanqui (2005) describes as a 'profound impact over the long term process of circulation and exchange established in colonial times' (Rivera Cusicanqui 2005: 25). The formation of the Andean national-states mapped new borderlands and fiscal control of the routes that commodities passed through from their production to the sites of consumption, 'turning internal market exchanges into import-export trade or into contraband' (ibid). Medicinal plant knowledge and products were able to take on national identities through international trade exhibitions that combined the countries' history, ethnic groups, natural resources and modernity in the creation of national claims to indigenous knowledge and biodiversity.

Bolivia defined its identity through international trade exhibitions, gaining external and international recognition for pharmaceutical extracts and products from the national flora. The international exhibition of Paris in 1889 formed an important link for external recognition of the nation's commerce, and was used to legitimise the importance of the Bolivian ethnic group, the Kallawayas, with an inventory of over one hundred plants used medicinally (Loza 2004). The exhibition in Paris enabled external validation and international recognition of the medicinal plants' pharmaceutical properties. Unlike neighbouring states, Bolivia promoted medicinal plants and was the only nation in Latin America to register these in its constitution. The exhibition opened the doors to pharmaceutical products of national origin combining traditional knowledge with the licences for extraction and production regulated by the state. The process also led to classification of medicinal plants pharmacologically, and 'traditional', and 'indigenous' uses of plants based on features of plants other than their individual pharmaceutical properties.

The Republic of Bolivia was formed 1825 with nine political departments each subdivided into municipalities. The new Republic's western border with Chile separated the geographic and ecological regions of the Pacific coast and the Andean plateau along the western mountain chain. In doing so the division also separated the territory of the southern Andean *ayllu* across two countries. In Bolivia the Altiplano was divided into three departments; Oruro, Potosi and La Paz, each centred around their principal cities of the same name Oruro, Potosi and La Paz. In the southern Andes, the departments of Oruro and Potosi, limited the *ayllu* and the land-holding of Paria, itself based on the *ayllu* of the Sora ethnic group (Del Ríos 2005), to the upper eastern cordillera, and the *ayllu's* territory in the eastern valley became part of the departments of Cochabamba and Sucre and private land-holdings or *hacienda*. The political division of the departments divided the ecological regions of the highland and lowland, previously under control of a single *ayllu* community or the Spanish owned *encomienda*. Regional land-holding products and commerce became centralised through markets, although traditional communal systems of ritual and extended family ties were used by rural communities to maintain links with the valley communities of their *ayllu* to access subsistence resources through exchange on annual migrations. With the development of marketplace exchange these extended kinship ties continue as

an extension of the Andean social system in the marketplace, albeit by families and not communities in Oruro. Centralisation of trade and resources from each department created cultural identity based in regional market centres while marketplaces reinforced trader's identities as urban traders. The identity of Orureño from Oruro, *Cochalo* from Cochabamba, *Camba* from Santa Cruz, and *Paceño* from La Paz, reinforced politically-defined identities that extended to the products sold at the marketplaces and encompassed the new departments regional history and geography extending a national identity centred in the capital city of each department. These were identities that encompassed the ethnic history of the region but at the same time were separated from the rural community by the political, economic and population centre of the marketplace location in the city and its political economic relationship to the state.

The annual migrations to lowland valleys with llama caravans continue today, albeit by much smaller groups. The main bulk of trade has been replaced by motorised transport and a market system based in periodic weekly and annual markets held in the highland towns. The market exchange between ecological regions continues to use extended kinship ties (Rist 2002). Studies of the weekly market known as the Kantuta, held in Oruro city (León et al. 2003), and the weekly rural market held in the town of Caracollo 2km outside of Oruro city (Bernabe et al. 2003), demonstrate the continuation of extended family ties to access resources in the valley that correspond to communal *ayllu*.

4.4.4 The development of urban marketplaces and trade unions

During the first half of the last century Oruro became the economic centre of the country following the development of tin mines, making their owner Simon Patiño, one of the richest men in the world. The increase in wealth saw a corresponding change in the urban landscape and the adoption of the European style of the era, with long boulevards, tarmac and wide pavements lined by trees, central plaza with band stand, European fountains and a move away from colonial building design. The new city also required new marketplaces. Oruro was the first city in Bolivia to have an enclosed marketplace. The Fermin Lopez market located two blocks from the central plaza opened in 1913, and the Campero market located outside the train station and four blocks from the central plaza, opened in 1914 (recorded in the summary of municipal

works, Resúmen del labores de la Municipalida de 1914). The new enclosed markets replaced the open markets (known as markets of *indios*) for the redistribution of essential and fresh food products to the city's population, and created space for specialisation and urban market traders located in permanent marketplaces. During the 1940s, the enclosed marketplaces were further divided into sections based on the products sold, forming specialisation through particular products. Residence of Oruro recalled how this led to the development of the specialist groups of traders and the section of 'Home Remedies' in the central marketplaces selling medicinal plants and mixtures.

Rural weekly and annual markets known as *ferias* were established in the 1940s in towns around Oruro. These were supported by departmental funds for the promotion of agricultural production, offering prizes and funding for the municipalities and communities they were held in. Elder residence of Oruro recall, the 1940s saw a second major change in the urban organisation of informal trade, with the introduction of municipal officers, and the prohibition of hawkers and street traders in the city centre outside weekly market days. The city's head of markets ordered permits for street traders and was nicknamed '*El Loco*' (Crazy). People in Oruro considered the sight of *indios* sitting on street corners selling produce as part of the urban landscape, and a part of the *indios*' nature that could not be changed. Street traders however were not permitted in the city centre, where they would block the pavement or entrances to people's house or shops. This forced rural producers and temporary or seasonal traders into temporary markets and weekly fairs and to the city outskirts.

The agricultural reform of 1953 brought about the redistribution of large non-indigenous *hacienda* landholding to indigenous people, forming new communities, nationalisation of the mines, and saw a movement from ethnic to social class in politics (Nash 1979). It is worth noting that there were no large private estates established in Caranagas which form western Oruro (Cottyn 2012: 42). The social class of *campesino* (subsistence farmers from the countryside, *campo* in Spanish) replaced the multiple ethnic identities with a single social class of peasants and labour workers; *mestizo* and *cholo/a* (*cholo* male, *chola* female) middle class became related to traders, and the *elite* upper administrative, business and political class replaced, and overlaid, the ethnic classes of *indio*, *mestizo* and European. In the dictatorships that followed the agrarian

reform, national identity was promoted and celebrated through folklore and popular culture, while ethnic identity, represented by traditional beliefs, healing and indigenous people was repressed. The political policy of the period promoted the opening of schools in rural communities and the teaching of Spanish language only, to enable equality and access to higher education. Meetings or unions and forms of political opposition in rural communities or labour organisations were repressed, along with expressions of indigenous identity such as rituals including those for healing, which became clandestine. The Law no. 03501 of 1953 authorised the periodic weekly and annual *feria* markets to operate free from municipal taxes creating an expansion of the existing *feria* and creation of new *feria* in the rural areas of Oruro. This also created new networks of redistribution with inter departmental truck drivers and middlemen who supplied the urban centres (Bernabe et al. 2003: 30-31).

Traditional Andean culture was universalised through ‘folklorization’, with the national state appropriating ceremonies for political ends by nationalising popular culture (Goldstein 1998). In 1968, folk music produced by *campesino* groups and folklore in general became the property of the state. In 1970, the national department of folklore and its regional sub-committees began to compile registers and inventories of various dances and music classified by the state as ‘folkloric’. The support and sponsorship of the Carnival of Oruro held in Oruro city, led to the designation of the city as the ‘Folkloric Capital of Bolivia’ (Guerra 1990). At the same time the process created an opportunity to reinforce identity for people of Oruro as true custodians of national culture and as the authentic centre of origin. The designation of ‘Capital of Bolivian Folklore’ enabled the carnival and its ritual traditions, and the offerings of *mesas* used in Oruro, to become symbolic of the identity of Oruro and its residents, in both national and international discourse, and was seen as distinct from the local indigenous and ethnic communities of the nation and other departments.

The 1980s saw the dictatorships overthrown and the initiation of a revival in public displays of ethnic identity; with rituals accompanied by collective representation in political unions, and the movement of rural migrants into open and public spaces in the city, notably through the development of street markets. Ritual offerings of *k’oa* started to be performed in public spaces. Residents of Oruro recalled how the distinct scent and pungent aroma of *k’oa* plants filled the air in the commercial zone around the

central Fermin Lopez market when the monthly offerings were made by merchants for good sales. On the first Friday of each month, and on other important dates in the Andean calendar, merchants burn *k'oa mesa* to protect their future trade and give thanks for a good month of sales. The relaxation of regulations for public meetings and groups saw the development of marketplace unions, and the union of traditional healers and producers of medicinal plant products. Traditional medicine became recognised by the Ministry of Health through SOBOMETRA (the Society for Bolivian Traditional Medicine) as an official body. The market unions formed two groups: those of the enclosed and established marketplaces, and the new groups of 'street' traders weekly *ferias*. For medicinal plant traders this created three categories: the established traders of internal enclosed markets; the new migrant traders who took up positions in established markets; the new street markets; and a further set of modern *naturistas* selling semi-processed and packaged medicinal plant products in temporary marketplaces and shops catering for the new modern international Bolivia.

In Oruro, street traders were temporary residents and migrants from neighbouring rural communities, now able to appropriate the urban spaces by forming market unions with political representation. The period saw the development of a series of weekly *feria* markets in the different residential zones of the city. The Junin street market, previously an open market, became affiliated to the enclosed central Campero market. The market in Junin street was frequented by traders from Condo and Cahuayo communities of the eastern Azanaque region who sold a diversity of medicinal plant products purchased at other markets, producers from the upper valley of Tapacari who supplied fresh plants used as medicine, and local *chiflera* or itinerant traders who resided in Oruro city. The political and economic organisation and dominance of the *chola* traders from Cahuayo and Condo enabled them to establish a permanent market and dominate the union and purchase of kiosks. The temporal and seasonal traders from Tapacari (wearing the indigenous ethnic clothes of their community) with fresh products were forced onto the adjacent street and established a weekly *feria* market without permanent kiosks. The *chiflera* or small scale traders of Oruro city either took stalls in the street market or moved on.

The oppression of ethnic groups during the dictatorships gave rise to an 'indigenous' movement of Aymara intellectuals who utilised not only the rhetoric of left wing class

oppression, but also articulated the idea of the oppression of indigenous nations' (Gisselquist 2005). The indigenous and workers movements in Bolivia were thus combined through the political party organisation Movimiento al Socialismo (MAS) and their 'indigenous' party leader Evo Morales. The party organised protests, marches and road blocks that forced the resignation of the Bolivian president Carlos Mesa in 2004. The subsequent election of Morales saw the introduction of indigenous rituals at official events which elevated their status. This created conflict between the class-based authority of traditional knowledge of the older traders established in enclosed marketplaces and the new ethnically-defined street traders and groups gaining stalls in established marketplaces. For the medicinal plant market traders in Oruro, the identity of Orureños and the central market was contrasted with the rural communities and new migrants with stalls in the central Fermin Lopez market and the Junin street market. This fuelled the ongoing conflict between rural and urban centres in terms of the cultural origin of traditional knowledge, rituals and medicinal plant knowledge, and the corresponding social and political systems, which represent, define and regulate them.

4.5 Ethnicity, social class and conflict of ritual performance between rural migrants and urban residents in Oruro city

People of Oruro city construct their identity based on the city's historic past, its present political and economic role as a trade, mining and cultural centre, and the declaration of Oruro as the 'Folkloric Capital of Bolivia'. Recent conflicts in Oruro city can be traced to the claim of the rights of original traditions and customs of Oruro, between the community of urban residents and recent migrant communities from rural areas.

Condarco (2006) argues that Oruro city's character and cultural development is a product not only of the peoples' resistance to the harsh environment, its unique natural resources of agriculture and mining or its location on the regional trade network, but a combination of these which unite the city's residents against the dominant state. The dynamic identity formed from the city's history, mine industry and role as a commercial centre is represented in the local forms of ritual and fiesta, including the carnival of Oruro and medicinal products and mixtures used for offerings and healing sold in the marketplaces.

The French naturalist and anthropologist Alcides d'Orbigny describes his visit to Oruro in 1883:

'When I approached Oruro, I came up against the miserable aspect of this city and the large amount of houses in ruins, which could be seen everywhere. It would have thought to have been abandoned for the scarce inhabitants. One does not get surprised by the decadence of this city founded 4,000 metres above sea level and in a cold meseta where the wind blows almost continuously' (Translated by author from original text cited in Condarco 2006: 72-73).

Oruro was 'reborn' in the 20th century as an economic and cultural centre, with the world's largest tin mine located outside the city in the town of Huanuni and the country's first foundry built at Vinto, two kilometres from Oruro city. This drew in a new wave of urban migration, informal traders and an international community, from the city's economic growth. Over the first half of the twentieth century Oruro saw immigrants arrive from Germany, Croatia, Hungary, the Middle East and Palestine. The fall in tin prices on the global market and the nationalisation of the mines in 1952

led to periods of out migration, one of the most notable was in the 1980s. The migration of mine workers was largely to the lowland valley towns of Cochabamba and Santa Cruz, although others moved to Chile and Argentina, or abroad to America and Spain seeking manual labour. Mine workers were paid a lump sum, which many used to purchase smallholdings in Cochabamba and establish coca plantations, and replicating the political structure of mine union through the development of the union of coca growers. The union of coca growers was the platform that launched Evo Morales, from Oruro, to become the current President. Oruro's migrant colonial populations took with them their urban traditions, the Carnival of Oruro city, dances, rituals and *mesas*, which formed part of their identity. These were used in the marginal suburbs of Cochabamba (Goldstein, 1998). I found that this urban identity of Oruro city has also formed an important market for the Orureñean products and for ritual offering of the *mesa blanca* produced and used in the Oruro carnival. Traders with market outlets in Cochabamba, Santa Cruz and Argentina come to Oruro to buy prepared *mesa* mixtures wholesale from the city's central marketplace the Fermin Lopez market. Smaller scale informal traders from the outer marketplaces of Oruro, in particular the Calle Junin, take the ingredients for the ritual *mesa* mixture to sell directly in Cochabamba and Santa Cruz, and commented on the high prices they could gain there. The *mesa* of Oruro has become a form of identity and unity for Orureñeans, Oruro city migrants and colonies.

The population growth of Oruro over the last half-century has seen a corresponding growth of the middle classes and informal traders. Residents and market traders explain this as being due to Oruro's location on the trade routes, a relaxation in border controls and changes in urban administrative structure. The new street and periodic marketplaces, with their sprawling mass of thousands of stalls on market days, are a testament to the migrant population's dominant role in local politics through market unions of 'informal' street traders, and control of the supply in rural products and black market imports or 'contraband'. The market trade of white electric goods and imported clothes, line over five kilometres of road with stalls around the central marketplace the Fermin Lopez market twice a week. Older residents of Oruro city centre commented:

“We are no longer an international cosmopolitan population with a diverse cultured elite drawing in opera, classical music, dance and the associated schools, academic institutions and architecture from Europe. The new

population are *cholos*, *contrabandistas* illegal traders, characterised by a great desire to demonstrate their new economic and social status in wealth, buying new cars, houses, placing neon lights on these”.

The use of imported values of cultural identity from international sources seen on television and film are contrasted against the values of residents who attended the social clubs. The ‘Sociedad 10 de Febrero’ (10th of February Society) of Oruro city was established in the early 1900s and produced notable literary pieces, supported political and social movements including women’s rights, and sponsored charitable centres for the elderly and homeless in conjunction with the church. The older residents talk of the distinguished balls and social clubs, bars of a cultured elite, social projects and academic literature including advances in economic and ethnographic studies of rural traditions and folklore. These have been replaced by what common opinion considers a power hungry corrupt administrative system that favours recent migrants over established residents. Examples of the ‘new wealth’ include the gang of Creole Hells Angels, innumerable burger bars and pizza restaurants, the latest in sound systems bleating or blasting out the latest pop music from imported street racer cars. Oruro has become the commercial centre for legally and illegally imported cars, white goods and second hand clothes for Bolivia, all traded through the ‘informal market’. This social tension has been accompanied by the revival of the value of Andean heritage and tradition by the migrant traders as a national identity and form of social modernity.

4.5.1 Conflict and identity of indigenous communities and national traditions

The political use of ritual traditions, and changing attitudes to identity, have been influenced by politics in Bolivia, and provide an insight into medicinal plant trading activities. The formation of national identity through modernity in Bolivia is based on the recognition of the historic and cultural traditions on which it is founded. This has led to a growth in defining the authentic Andean traditions and beliefs and acceptance of the public performance of their associated rituals and offerings. A practice that was previously associated with superstition, lower classes and rural lifestyle, an identity that recent urban migrants were trying to shed, is now widely accepted. A representation of rural ideals, the ritual offering of *k’oa*, stigmatised as rural peasant belief, has now become central to identity discourse, with the ritual being performed for official acts of

government and for the *Municipalidad de Oruro* (Council of Oruro), for the inauguration new buildings or works. The use of tradition to create a modern national identity in Bolivia has also created spaces where indigenous people can assert claims as custodians of cultural patrimony (Goldstein 1998). This has promoted new categories for medicinal plants and rituals. Political groups have developed into representative bodies for the new 'natural' medicine for internal and topical application of plants, or communities and market stallholders use of internal and topical application of plants based in 'traditional medicine' and the 'traditional ritual medicine' of healing using plants as *mesa* offerings asking for health. While the emphasis on ritual use of *mesas* (Literally Spanish: table; though in the Andean region *mesa* refers to a collection of natural objects used for rituals of exchange and healing), as offerings to *Pachamama* (Quechua: mother earth) is symbolic of the past, variations in *mesas* and their uses for offerings, cleansing, and as medicine are not differentiated. This in turn has created new forms and categories for the classification of the ritual *mesas*. The traditional ritual medicine *mesa* was previously referred to under two categories of *k'oa mesa* for offering and *mesa negra*, for witchcraft. The *k'oa mesa*'s name stems from the use of the pungent aromatic *k'oa* plants used as its base and the form of offering to *k'oachar* referring to the ritual of burning, the *mesa blanca* was a form of *k'oar* used in urban areas. This category has become separated into the *k'oa mesa* and *mesa blanca* or *Pachmama mesa*. The *k'oa mesa* is associated with livestock and agriculture of the peasant countryside, while the *mesa blanca* is related to mines, professional workers or market traders and burnt as an offering on designated days and during festivities for the annual carnival of Oruro by merchants and professional bodies in the city, notably in the offices of the city's lawyers and legal profession (for a full description of types, composition and symbolism of *mesa* in Oruro see Armstrong 1989).

The importance of history to modern Bolivian identity, and how social and ethnic groups influence perceptions of 'traditional' and 'indigenous' knowledge, is reflected by public performances of rituals and notable the annual carnival of Oruro city. The carnival has grown over the last thirty years to gain national and international importance and recognition, drawing in huge crowds and providing an important 'informal' income for the city. The carnival has representations of Bolivia's diverse cultures and traditions through stylised dance groups and music. The role of *pasante* and the sponsor of dance troupes is taken on by different fraternities, labour groups and

businesses in Oruro. The dance troupes include the famous *Diablos* (devils), with their characters *Supay* (an ambivalent character akin to the spirit of the earth in Andean beliefs, and the devil for the Catholic church), and his companion the *China supay* (*Supay's* female companion), the dance troupe is led by the *Arcángel Miguel* (Archangel Michael), the patron saint of Oruro city. The oldest dance troupe of 'devils' are the Mañazos, the butchers' group, other devil troupes include "*La Diablada Ferroviaria*" the rail workers group, and the prestigious *Fraternidad Artística y Cultural "La Diablada"*, Artistic and Cultural Fraternity 'The devils', formed of high society members. The largest representation of dancers in the carnival is 'La Morenada' danced by the Cocani group. The Cocani originate from, and some still are, the merchants and traders of coca leaf in Oruro, migrants from the communities of Cairiri, Yacariri, Paruta, P'uchu and villages near Umala, Aroma province, department of La Paz. The Cocani state that they began dancing in 1924, and currently have over a thousand dancers each year. The group and dances represent the change from identity of rural ethnic communities to urban trades and unions. The carnival gained Oruro city the title of 'Cultural Centre of Bolivia' in 2005, and the official recognition from UNESCO as one of the nineteen 'Masterpiece of Oral and Intangible Heritage of Humanity'. The UNESCO report highlights the 20,000 dancers and 10,000 musicians who take part each year.

The conflict between tradition set in the rural area and the modern urban identity drawn from historic past was evident in 2006 when the official carnival of Oruro was placed in conflict with both the state and rural communities. The new state identity under the proclaimed 'indigenous' president, himself from Oruro, wanted to claim the Oruro carnival with its national identity as folklore capital of Bolivia and place its committee, funds and regulation under the state. The state department claimed that the carnival did not represent the traditional indigenous communities and wanted these to represent the dance groups rather than the city's industrial labour groups and merchants. In 2004 the first 'traditional indigenous' *Anata Andina* (Aymara: Andean Carnival) was performed in Oruro city, a week before the official carnival. In rural communities the *anata* is sponsored by the local council and communal members referred to as the *pasante*, a position held for a year, and in honour of the local church. In Oruro city the carnival is held in honour of the Virgin of the mine shaft '*Virgin del Candelaria*' or '*Virgin del Socavón*', patron of the miners and declared the patron of national folklore by the

Bolivian government in 1994, whose image is held in the sanctuary of the *Virgen del Socavón*, the sanctuary of the mine shaft Virgin (Previously the church of the mine shaft) in Oruro city.

The official carnival committee of Oruro opposed the state view and maintained that Oruro had autonomy with respect to the carnival, using the rationale that the UNESCO title was given to Oruro, and not to Bolivia. However, Morales supported the initiation of the *Anata Andina* (Andean Carnival) to be held a week before the Oruro carnival in Oruro city and which follow the same route as the carnival. To encourage participation, the *Anata Andina* was sponsored by the government with an offer of five tractors and several llamas for the best performance of traditional dance and ritual of *Anata* by an indigenous Andean community. The result was an urban reproduction of the ‘Andean tradition’ that could be perceived as an authentic ritual for touristic and international purposes. However, it was out of place, as in the rural community it acts as a social mechanism for regulating human and environmental interaction, through redistribution of lands and communal resources. In Oruro city it represented tradition as a product of Andean indigenous rural communities uniting them with identity and political representation; not as separate parts of the regional political departments but united and represented as the origin for traditional knowledge and an identity to enable access to state resources, on a par with the urban workers unions represented by the carnival of Oruro.

The *Anata* and its corresponding rituals performed in rural communities, involve sequential ritual offerings each taking several hours, each performed at ritual sites in and around the community, and each carried out by communal groups and by specific actors. The animals are bought for the ritual, their blood is spilt as a representation of food to the mother earth and their meat is used in communal feasting. In rural communities, the success of a ritual and the *Anata* is judged by the correct performance of the rituals, and the election of a future *pasante* to oversee the rituals in the coming year.

In Oruro city, for the performance of the *Anata Andina*, each community entered a group of dancers and were judged in an allocated time slot of ten minutes on their costume and the performance of ‘authentic traditions’ by a panel of judges selected

from local council and governmental positions. The *Anata Andina* held in Oruro city 2006 was a combination of exaggerated costumes, dance routines and ritual offerings from the perceived 'tradition'. The more enthusiastic community groups were well-prepared. While the dance group performed, a group of men ran onto the centre stage to perform the traditional hour-long rituals in the allotted ten minutes. The series of ritual enactments were performed simultaneously, one man throwing down the traditional *awayu* sheet on which the ritual offering is prepared, one scattering coca leaves, another performing the *challa*, sprinkling alcohol to the four corners while the *yatiri* figure knelt reciting the names of the communal boundaries and names for features in the landscape. As they finished, a pair of llama were brought to centre stage, their throat cut, blood collected in a bowl and tossed to the four corners of the earth in thanks. It was this last act that drew the throng of photographers and formed the images used to represent the *Anata Andina*, 'Andean tradition' and ritual, published in the national press and internet. These scenes were also cheered by the local crowd and tourists. The interpretation and identity of urban, international and touristic impositions, the aspect of animal bloodletting and sacrifice that ritual has taken on in an urban setting, has been extended to the medicinal *mesa* used for curing. This representation of the *mesa* and Andean ritual by external systems and within the current political state of Bolivia has left behind and distanced itself from the rituals traditional purpose as a cultural system for the redistribution of resources in communities and its biological functions to regulate redistribution of resources, and selection and use of plants to maintain health. This conflict of identity, authority and criteria of authentic traditions between local departmental authority based in the department's central city, national identity of the state and the rural towns, is repeated and reflected in the natural medicine and ritual *mesas* used in these events. Categories of medicinal plant knowledge are commodities that are defined, influenced and embedded in local, national and global discourses of 'indigenous', 'traditional' and 'ritual'. The dual purpose of the ritual as medicinal and as symbolic is reduced to a single cultural category and the corresponding ethnobiological knowledge to be defined by external institutions as symbolic.

4.6 Summary

Bolivian medicinal plant products and medicinal plant knowledge are influenced by the complex ecological, social and cultural diversity found in the country. Medicinal plant

knowledge includes Bolivian people's ongoing interaction with their environment and other groups through trade, forming cultural systems and social economic mechanisms to regulate trade and transmit knowledge. This knowledge is localised by local ecological conditions, social differences and people's position on trade networks. In Oruro the different types of medicinal knowledge are defined by local, national and international bodies. Medicinal plant traders in Oruro need to construct their identity using ethnicity, social class and nationality to access market space, resources, and to create niche markets for their products. Recent conflict over identity and knowledge in Bolivia has been created by the resurgence of 'indigenous' identity based in the territory of rural communities over the social groups and trade unions formed in urban areas. This has shifted the origin and authority of knowledge away from the national commodity of 'tradition' to one of 'indigenous' defined by ethnic groups as a result of the interaction of diverse social and cultural groups, and individual communities. This chapter provides the background to be able to analyse how the different forms of specialist medicinal plant knowledge of market stallholders are differentiated from other forms of healing. The chapter also provides an outline to begin to analyse how knowledge of the ongoing interaction of humans and their environment, represented by medicinal plant use and resource distribution, is regulated and transmitted by different groups and at different marketplaces using Andean forms of social and cultural organisation found in Oruro.

Chapter 5

The Andean Medicinal Plant Market Network, Classification Systems and Distribution of Chemical Compounds

5.1 Introduction

This chapter describes how ethnobiological knowledge and folk classification are used to classify and redistribute the uneven distribution of pharmacological resources produced by plants from the different ecological regions of Bolivia, through the market network of the country. The chapter begins with an overview of the criteria and aspects that define the structure of folk classification and selection of plant species from multiple ecological regions when commercialised for their medicinal purposes. The next section describes the classification of ecological regions, the pharmacological compounds found in different ecological regions and across market regions, and draws on concepts from chemical ecology to develop a *chemical landscape* model. The following sections addresses variations in specialist stallholder's classification of pharmacopeia and local folk botanic classification. The final section provides examples of how chemotaxonomic classification and a chemical landscape model can be used to understand how the exchange system for medical plants can regulate over-exploitation and redistribution of plant species.

5.1 Aspects of medicinal plant classification and distribution

The natural pharmacopeia available in market stalls across the Bolivian Andes is formed of plant species from the diversity of ecological regions found in Bolivia. The focus of medicinal plant studies in Bolivia and the Andean region has been geographically and culturally bound by the territorial limits of local ethnic communities and often limited to national flora. Further, studies often only use local descriptions or names for plants and illnesses that are not comparable between regions or only demonstrate the uses of plants in a single location. The medicinal products sold in the marketplaces are made from chemical compounds sourced from plants, which are often

available from several plant species from different ecological regions or are highly endemic to a specific location. Studies of medicinal plants and of medicinal plant markets in the Andes provide inventories organised by the botanic genus and species of plants and their medicinal uses, but do not differentiate between local uses of plants and the uses they are sold for in the marketplace. This has resulted in detailed inventories of the local forms of use for medicinal plant species by communities with little insight into the selection of plant species for trade, differences between local and commercial use, the substitution of species with common properties in different regions, or the role of mixtures of plants in regulating trade. This section examines the production and redistribution of chemical properties produced by plants in the Andean market system and how Andean cultural and socio-economic systems can regulate trade, enable substitution between species, and prevent over-exploitation of resources.

Of Bolivia's 20,000 plant species some 1,000 have medicinal uses, and 200 to 250 species form the natural pharmacopeia available at market stalls across the Andes. The collection made from market stalls for this study found that over 200 plants from different ecological regions of the country are traded for specific medicinal uses in the marketplaces of Oruro city. A comparison of market stall inventories for three departments in Bolivia shows there is a standard stock of over 100 plants from across Bolivia with variation between marketplaces, dependant on local regional flora and seasonal availability. The efficiency of the Andean health system, and the success of a medicinal plant trader, is the result of their ability to provide a constant stock of this pharmacopeia throughout the year. This requires the combination, selection and redistribution of chemical compounds from abundant populations of local and external plants in forms that can be easily transported and stored without adulteration. Medicinal plant studies, botanical inventories, definitions of eco-regions and national plant checklists create an array of overlapping criteria that do not clearly represent the distribution of chemical compounds across geographic market regions. Botanical inventories rarely extend to the level of taxonomic variety, as do those used for cultivated crops. Such studies do not always identify the density, and abundance of plant species, or the concentration of active chemical compounds in flora across different regions. Further, botanical inventories do not distinguish between the distribution of biochemical properties or variations in their composition within single

species in different regions, or variations in the total quantity of chemical compositions and their distribution in multiple species across broader geographic regions.

To understand the trade network of medicinal compounds sourced from plants that are sold in Oruro, I have mapped, with what data are available, the distribution of the medicinal properties and compounds produced by plants, or species which provide the same treatments, to form a 'chemical landscape' and ecology, as described in the following section. This enables the identification of regional distributions and localised production of compounds from endemic plants, with pockets of abundance that can be commercially exploited. Common, broadly distributed, chemicals are either common in multiple species enabling substitution for locally available species, or single species with a broad distribution. Localised endemic compounds are produced in concentrations by endemic species or specific ecological conditions that enable abundance of flora with common properties.

In defining the market regions and the distribution of medicinal resources in the environment creating what I refer to as a chemical landscape, I stress the importance of using the therapeutic properties of the actual chemical compounds found in plants as units of comparison, through which plant species and their uses are arranged. Creating regions of chemical resources requires using geographic market regions with biological measures of the concentration, distribution and diversity of pharmacological compounds found in different plant species and varieties. This enables: 1) the differentiation of plant species that are only used locally, from those that are commercialised; 2) identification of multiple plant species with common chemical compounds from different environmental regions ; 3) identification of common chemicals which are wide spread across multiple species or in a common species with wide distribution, 4) 'endemic' compounds that result from endemic flora or a plant species adaption to specific environmental stress; and 5) identification of regions where a species is only used in the local pharmacopeia and regions where pockets of abundance are commercialised.

5.2.1 Ecological and floral diversity in Bolivia.

The rich diversity of ecological and phytogeographic regions found in Bolivia is a result of the country's varied climates (Pacheco et al. 1994). The national flora is estimated at over 20,000 species and includes a high number of endemic species. Bolivia's vegetation includes the large trees of the eastern lowlands with epiphytes, palms, spiny and succulent flora. The valley region combines scrub, cactus and fleshy herbaceous species, and the high Andes have a diversity of resinous bushes, low creeping herbs and grasses. Distinctive genera of the eastern lowlands include *Hevea*, *Rheedia* and *Theobroma* in the northern Amazon region, *Prosopis* and *Schinopsis* in the central Cerrado region, *Larrea* and *Synandropadix* in the Chaco- Pampean region, and the unique combination of Amazonian, Chaco-Pampean and Cerrado vegetation form the vegetation of the central Pantanal complex (Pacheco et al. 1994). Characteristic genera in the high Andean region include *Baccharis*, *Calceolaria*, *Nototriche* and the *Polylepis* species growing at 4,000 m.a.s.l. In the western cordillera, the Sajama national park of western Oruro and the Lauca national park of Chile form a protected area and the only area to have unbroken *queñua* forest of *Polylepis tarapacana* with a unique altitudinal distribution at 4200-5200 m.a.s.l.

Bolivia has several areas that are centres of plant diversity of international importance and national conservation status. These centres include the Apolobamba-Madidi corridor formed along the eastern foothills, where rapid changes in altitude from the valley floor to peak of 3,000 m.a.s.l. can occur over a few kilometres, the tropical Llanos de Mojos in the central eastern foothills and central eastern Serranias de Chiquitos. Bolivia also harbours an important diversity of genetic resources of wild and cultivated species. In Bolivia, the potato (*Solanum*) has over 150 wild and cultivated tuber-bearing botanic taxa, species of manioc (or yucca) (*Manihot*), and common bean (*Phaseolus*), are all cultivated (Beck 1998: 262). Bolivia also holds a high genetic diversity of maize in both wild and cultivated varieties that have developed independently from the landraces of Central America and Mexico (Avila 1998).

Bolivia's floral diversity is classified into eight phytogeographic zones based on the predominant forest type (Pacheco et al. 1994) and thirteen ecosystems of native Andean forest type, delimited by altitude and climate (Ibisca et al. 2003). The thirteen forest ecosystem types are classified by measures of aridity with a total of twenty-nine

different types of forest ecosystem defined by the predominant species of tree cover. This creates an uneven distribution of resources within a multi-niche environment formed of broad overlapping ecological zones with pockets of endemic flora and variations in the abundance of vegetation. Each region's distinctive climatic characteristics create variations in its ecosystem and form localised niche environments that define the flora together with the abundance and distribution of resources.

Bolivia's biodiversity and vegetation density are distributed asymmetrically, the highland Andean region has a comparatively low biodiversity and vegetation density, and the lowlands have a high biodiversity and vegetation density (Vandebroek et al. 2004). The dominant habit grouping for the highlands is herbs, shrubs, thicket and arid trees, and the area has high anthropogenic disturbance further reducing diversity. Although the Andes region has a low biodiversity it is a highly differentiated ecosystem that forms multiple local ecosystems and niche environments. The high diversity of environments in the Andean region has also given rise to the extensive interregional trade system in the region. In contrast the eastern lowlands have a much more homogenous distribution of vegetation across wide areas that has limited the development of local interregional trade systems.

In adapting to the different Andean environments, plants have developed specific characteristics to combat local environmental stress or to exploit niche environments, forming regions with concentration of chemical resources. These include the production of resins, leaf size for water storage, waxy coatings to reduce evaporation and chemicals. Herbaceous plants produce essential oils to deter pests or attract pollinators, while engorged roots and tubers are used to store water and nutrients during dry periods. Lowland trees have developed anti-fungal properties in response to the humid tropical climate, while high levels of bitter toxic chemicals deter herbivores from eating seed pods of trees in the dry southern lowlands (Araujo-Murakami et al. 2006). Highland flora need to adapt to high evaporation rates and frost, and produce small leaves with pungent resinous coatings, and those with vegetative parts that have high concentrations of bitter chemicals in the roots and leaves, that act as anti-freeze (García and Beck 2006). The manipulation of species to combat environmental stress through cultivation has further extended plant habitats and changed their chemical composition. Potatoes are a prime example that demonstrates the interaction of humans, health and

the environment. The selection of bitter potato varieties provides crops with protection against frost, and enables cultivation at higher altitudes, reflecting what Johns (1986) described as ‘chemical ecology’. The recognition of the need to process potatoes with high concentrations of bitter toxins, and the combination of small bitter varieties which enhance health with less bitter nutritive varieties, by the highland population, demonstrates the interrelation between environment, health and human diet. The adaptations of a plant’s chemical composition provides an important pharmaceutical resource used for medicine for the prevention and cure of illness. The wide distribution of these chemical resources are a result of multiple plant species adapting to common environmental constraints.

5.2.2 Ecological regions and medicinal plant distribution

Ecological studies have identified both exogenous and local definitions of environmental zones and limits for ecological units based on different resources. The classification of ecological regions in Bolivia varies according to the scale and focus of different studies, ranging between broad regional areas and detailed localised studies. Studies agree in identifying the country’s three broad vertically defined climatic belts running north to south:

- 1) The ‘cold’ high Andean region above 3,400 m.a.s.l. formed of the extensive Andean plateau (*Altiplano*) and the eastern and western cordillera;
- 2) The ‘warm’ semi-tropical inter-Andean valleys between 3,600 and 1,000 m.a.s.l. , forming a series of vertically-stacked environmental belts running north to south, and consisting of pre-puna (3,600 to 2,800 m.a.s.l.), mid (2,800 to 1,500 m.a.s.l.) and the lower valleys (below 1,500 m.a.s.l.);
- 3) The ‘tropical’ eastern lowland plains (*Oriente*) below 1,500 m.a.s.l., that form a series of broad transitional environmental zones between the northern humid Amazon, central Savanna and southern semi-arid Chaco.

Rainfall and temperature across the three belts falls on a gradient from north to south becoming drier in the south. The precise boundaries between ecological regions vary

between studies and are defined by a particular representative key plant species, habitats of economic value¹, or ecosystems² displaying local biological diversity.

Local vernacular classification for the central Andean ecological zones by Quechua ethnic groups were recorded and listed by Pulgar Vidal (1981) (table 1). However, these refer more to ecosystems than to a specific complex of climate, flora and fauna (Wilson 199: 294) or a strict altitudinal / latitudinal limit, and form zones of natural resources.

Table 1. Quechua environmental zones elaborated from Vidal (1979).

Quechua Zone	Environmental zone	Altitude range m.a.s.l.	Primary Resource
<i>Chala</i>	West Pacific Coast	0– 500	Coastal resources
<i>Omagua</i>	Low jungle Amazonic rain forest	80– 400	Forest, wetlands
<i>Ruparupa</i>	High jungle, <i>Selva alta</i> .	400– 1000	Forest, trees
<i>Yunga</i>	Aymara “Warm Lands” Cloud forest	1000- 2300	Forest, fruit trees.
<i>Quechua</i>	High valleys	2300– 3500	Crop Maize
<i>Suni</i>	High plateaus and cliffs	3500– 4000	Crop potato
<i>Puna</i>	"mountain top"	4100– 4800	High altitude flora
<i>Janca</i>	Rocks snow and ice.	> 4800	No flora

These named regions, developed from ecological studies, are not specific to medicinal plants, and do not differentiate between diversity, concentration and distribution of chemical properties of the medicinal plants, or uses of medicinal plants within or across regions.

Girault (1987) recorded 900 medicinal plants sourced from across the central Andes region and used by the Kallawaya, an ethnic group of northern Bolivia. The distribution of the species across Bolivia is shown in Table 2. Girault’s data demonstrate the importance of the diversity of ecological regions in Bolivia for understanding the local pharmacopeia.

¹ For examples of economic botany, see Granado (1931) or Cardenas (1989) ‘Manual de Plantas Economicas de Bolivia’. For agriculture and pasture resources see Vera (2006).

² For ecosystems see Ibisch et al. (2003), who describes thirteen ecosystems for Bolivia, delimited by altitude and climate, with sub ecosystems classified by measures of aridity, and twenty-nine types of forest ecosystems defined by the predominant type of tree cover. The varying criteria Ecosystems used by Ibisch et al. (2003) best describe the regional distribution and diversity of flora with medicinal uses.

Table 2. Distribution of medicinal species in ecological zones; table developed by author, following Girault (1987).

Environmental Topography	Climate	Altitude	No. of species
High mountain and <i>puna</i>	Very cold	4000-4600	18
Andean plateau <i>Altiplano</i>	Cold	3600-3900	92
High valley <i>Pre-puna</i>	Warm	3200 - 3700	386
Inter Andean valleys	Hot	1900-2700	65
Mountain foothills	Hot	1800-2200	62
Sub tropical valley	Hot	1200-1700	124
Tropical regions	Very Hot	500-1100	116
<i>Sabanas</i> and coast	Hot	500m	5
		Total	868

In addition to ecological zones, Andean farmers use complex classifications for local ecosystems based on soil colour, slope direction and other local factors which affect cultivation of plant species. This demonstrates that Andean people recognise and differentiate between general ecological zones for production of resources and localised environmental effects on varieties of plants. These observations by Andeans, of environmental affects on plants, are extended to plant compounds and reflected in the Andean lexicon. In potato cultivation, varieties from higher altitudes have a bitter taste this is recognised in Aymaran lexicons and is used for the classification of potato toxicity at a level that requires processing for consumption (Johns 1986). The potato varieties in question, and the concentration of toxicity, also correspond to the altitude and *jalca* region above 3,200. From my own research, I found that ecological zones and the specific places that plant species came from were an important feature of the classification system. Place names used in folk classification corresponded to traders' preference for the quality or concentrations of plant compounds found in these areas. These place names were used as markers to classify different botanic species with the same pharmaceutical properties or compound (see the examples of folk species *k'oa* in this chapter) or localised plants with higher quality. This resulted in communities commercialising locally abundant resources, while only using species with common compounds in their local pharmacopeia.

To understand how plants are selected, and the uses they are sold for in the marketplace, requires separating local uses for plants from their commercial use. In Oruro, medicinal plants are collected from the land around people's homes, areas of pasture, land in long fallow, as well as from open areas with non-intensive management. The exchange of medicinal plants incorporates not only native but exotic species, local varieties and plants from other predominant use categories including, craft, food crops and ritual. Economic categories of local, regional trade and industrial or commercial plant use can be used as basic scales of commercialisation. Broad ecological market regions create zones where the common adaptations of multiple plant species and the wide distribution of common plants with similar chemical compounds converge. A summary of pharmacological regions indicating the medical properties of species sold at the markets in Oruro is shown in table 3. Appendix 1 lists plant species and ecological regions and appendix 2 lists the source of plants and the markets they are commercialised in.

5.2.3 The market regions and trade routes of Bolivia

The Bolivian topography forms two market regions or corridors, the humid tropical north and the dry sub tropical south, each with internal market regions in the Altiplano, central valley and lowlands (figure 5 below). The two market corridors are separated by the mountainous terrain and dense undergrowth of the lowlands, linked only by Altiplano. Produce from the eastern valley and lowlands needs to travel up to the Altiplano, to La Paz in the north and Oruro in the south before being distributed along the Andean highway. From the city of La Paz the eastern trade route and market corridor runs through the humid tropical *yungas* valley to the Amazon, linking the market towns of Apollo and Caranavi to the Altiplano. From Oruro the eastern trade route and market corridor runs through the central valley and lowland regions whose environments combine the humid northern and dry southern ecology, linking Oruro to the market centre of Cochabamba in the valley, the market centre of Santa Cruz in the lowland before crossing into Brazil.

		ENVIRONMENTAL CHARACTERISTICS				ECOLOGY		MEDICINAL CHARACTERISTICS	
Geographic Region	Ecological zone Altitude in m.a.s.l.	Mean annual temperature	Rainfall in millimetres	Characteristic ecology	Important medicinal taxa	Dominant pharmacopeia use			
High Andes	Cordillera 4,000 to 4,800m Entire region.	10 °C Frost over six months	Dry to wet from NE to SW 100 to 700mm	High plains, lakes, <i>Polyepis</i> forest.	Low herbs engorged roots, wetland fleshy flora.	Respiratory illness, for fright and cold, viral illness with spots.			
	Plateau 3,500 to 4,200m Entire region.	14 °C Frost for five months	Dry to wet from NE to SW 100 to 700mm	Grasses, stands of resinous bushes,	Resinous bushes of the genera <i>Baccharis</i> and <i>Parastrephia</i> , Cactus.	Respiratory illness, for fright and cold stomach infection, ritual.			
Valley	Yungas 500 to 3,500m North west, islands in south.	Warm tropical 15 to 24 °C	Humid 2000 to 3000mm	Cloud & humid evergreen forest, lush vegetation.	Fleshy herbaceous flora: Piperaceae, Tree ferns: Cyatheaceae & Resinous trees.	Stomach and urinary tract infection, respiratory infection, bruises and bones.			
	Bolivian Tucuman forest 800 to 3,000m Central expanding in east.	Warm 13 to 23 °C	Humid 700 to 2000mm	Hardwood forest.	Trees: <i>Tipuana tipu</i> bark and other trees with strong odour.	Respiratory illness.			
	Dry inter-Andean valley 500 to 3,300m Southern region.	Warm 12 to 16 °C (can reach 30 °C and drop below 0 °C)	Arid 300 to 600mm	Cactus stands, low trees, resinous bushes.	Tree seeds / bark: <i>Acacia sp.</i> , Leguminosae, <i>Propolis</i> , <i>Schinus molle</i> , <i>Kageneckia lanceolata</i> , Cactaceae.	Intestinal parasite cleansing with toxicity of leguminous seeds, Respiratory illness.			
Lowland	Amazon 150 to 1,500m Northern region.	Topical 25 to 27 °C	Humid 1200 to 5000mm	Dense, species diverse, wet jungle 45m high canopy.	Vines, Trees: Leguminosae, Moraceae, Araceae (palms) Lauraceae, Euphorbiaceae, <i>Chinchona</i> .	Saps and resins, anti viral and bacterial hardwood malaria, fever.			
	Wetlands & Humid flats 150 to 250m North and central.	Tropical 26 °C	Humid 1000 to 2000mm	Grasses, trees & palms along river bank.	Palms.	Palm nuts used in cleansing rituals.			
	Dry Chiquito forest 300 to 1,200m Central region.	Sub tropical 18 to 23 °C	Dry 100 to 1500mm	Forest semi deciduous, column cactus 15m stands.	Trees: Leguminosae, Anadenathera.	Tree seeds toxic levels used in cleansing rituals.			
	El Chaco, Southern dry 300 to 500m Southern region.	Tropical 18 to 26 °C (max 48 °C min 1 °C)	Arid 40 to 1200mm	Dry deciduous forest 25m trees, column cactus 5 to 15m.	Trees: Leguminosae, Anacardiaceae.	Parasitic cleansing with toxic tree seeds.			

Table 3. Ecological regions of medicinal flora used in central Andean pharmacopeia.

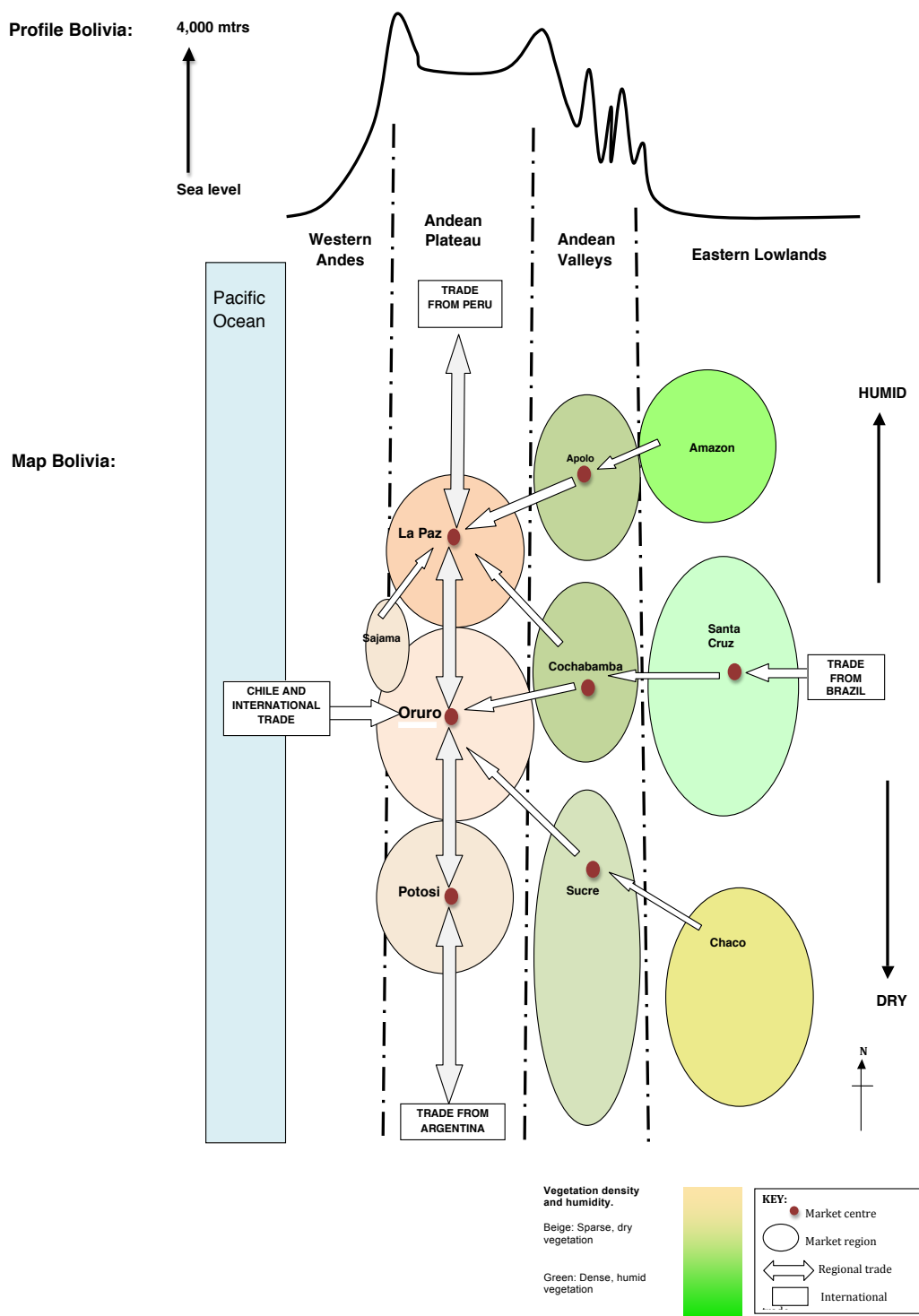


Figure 5. Market network and the ecology of market regions of Bolivia.

The Andean highway connects the commercial centres of Oruro city in the south directly to the city of La Paz in the north. Placed on the Altiplano and at the cross roads between the east-west and north-south trade routes, the cities of Oruro and La Paz act as distribution centres for regional produce across Bolivia and to international trade routes. The Andean highway extends across the continent and links Bolivia to the neighbouring Andean countries, of Peru from La Paz and to Argentina from Oruro. The western routes from each city run to the international seaports and connect with global trade from the Pacific coast.

The Altiplano, valley and lowlands form internal market regions within each market corridor. The internal trade circuit enables exchange between individuals, specialists and communities of each environmental region through weekly rural markets. Central marketplaces in each region enable redistribution of produce between rural communities, external and international market regions, and act as centres for distribution of imported and manufactured goods. Weekly markets held on the Altiplano enable producers from the valley region to trade directly with the highland. Exchange between the southern and northern market regions is operated by merchants located in the marketplaces of the highland cities of Oruro and La Paz. Exchange between the highland and lowland market regions operates through merchants located in the upper or central valley. These merchants sell directly to central marketplaces located in highland urban centres and at annual marketplaces held on the Altiplano. The annual markets form a socio-economic system that enables the distribution of products from the lowland regions and between northern and southern market corridors without the need to pass through market centres. They enable producers, regional bulking agents and itinerant traders to overcome the prohibitive high cost of transport for smaller quantities of stock to multiple customers, or participating in weekly markets, or the multiple price increases created through the sequences of middle men and traders along market chains between market regions. The location and role of weekly and annual markets is shown in figures 6 and 7 below.

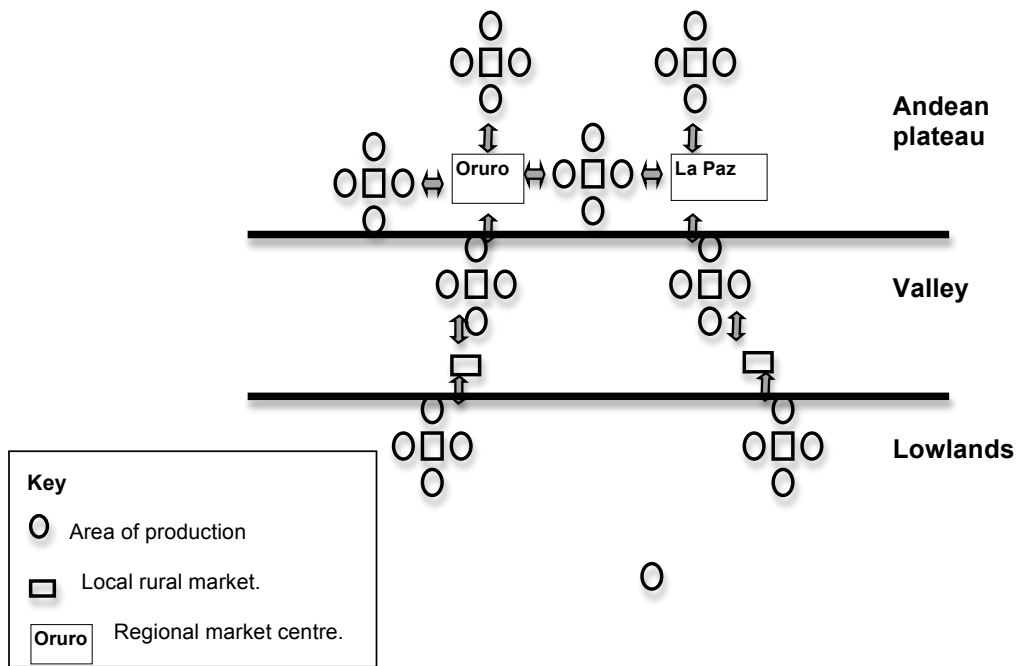


Figure 6. Movement of produce through weekly markets in Bolivia.

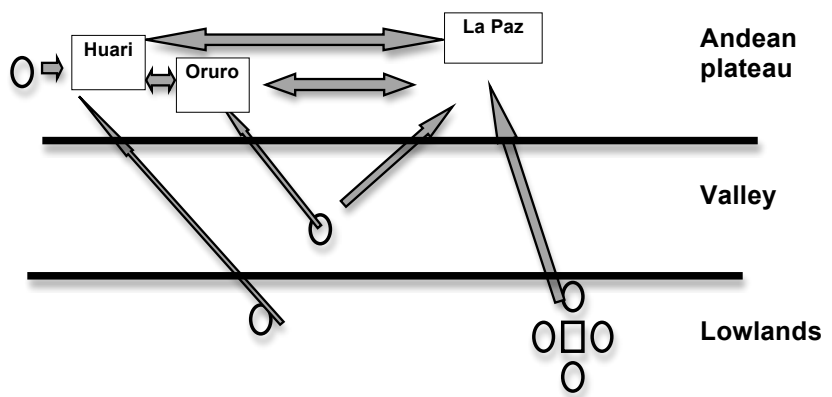


Figure 7. Movement of products through annual markets in Bolivia.

5.2.4 The chemical landscape and pharmaceutical resources of market regions

Medicinal plant trade combines plants with different patterns of distribution, some are widely dispersed, others common or highly endemic. Due to the overlap between common medicinal properties across multiple species and pockets of endemic flora with endemic chemical compounds, neither climatic nor ecological zones alone can be used to describe the distribution of medicinal resources in Bolivia. To understand the distribution of medicinal resources in each market region requires mapping a chemical landscape for the distribution of chemical compounds across the flora. Within these regions medicinal resources or the chemical compounds produced by plants are represented by categories of plant parts which contain the chemicals and are sold in the marketplace of Oruro in the categories: 1) herbaceous and green or fleshy vegetative parts, 2) resins from bushes or trees, 3) roots and tubers, 4) seeds and nuts, 5) fruits, 6) flowers and 7) cacti. Plants are used locally and commercialised as medicine, health food, and used as ritual offerings for health, although the presence of a species and its local use as medicine does not equate to commercialisation. Factors of abundance, ease of access, distribution or other plants with similar properties, which act as local substitutes, all play a role in defining individual species presence and uses in local, regional and long distance trade. To understand the dynamic nature of the Andean pharmacopeia in relation to the uneven distribution of resources requires delimiting the chemical composition of medicinal plants into a chemical landscape defined by presence of chemical properties of plants and not presence or absence of plant species. This forms broad regions, localised endemic properties and areas of abundance that can be exploited and commercialised. This creates two patterns: for a) common chemical compounds that are widely available, and b) local endemic compounds which are abundant in only one place. Both require market systems to regulate distribution.

Within the broad environmental regions, common adaptations of plants result in a regional distribution of chemical compounds with high pharmaceutical and medicinal value, but a low local commercial value, as medicinal properties are abundant or substituted by multiple locally-endemic species with the same properties across the region. For example in the high Andean region the folk name *muña* is used for multiple common and endemic species of resinous bushes that grow above 3,000 metres, and are used for stomach ache and to aid digestion. The common property of the plant species is highly regarded as a medicine and as a condiment for food, and its abundance means

it is readily available in marketplaces across the Andean region at a low price. In the high Andes, individual plant species called *muña* are often endemic with limited distribution, although it is the common chemical property found in multiple species across the region that causes its low commercial value, as non-local plants are substituted for locally available species. While individual species are not evenly distributed and not locally abundant, the abundance of the chemical compound from multiple species enables a regional chemical stock from multiple species and interregional trade of the compound to lower elevations where the botanic species of the folk genus *muña*, or its shared chemical compounds, are not found. Merchants bulk stock from multiple suppliers and species across the region and trade at periodic regional marketplaces across the Andes, supplying directly to regional distributors and market stallholders at a low price and without exploiting the local endemic plant populations.

In contrast to the folk classification of *muña* (a complex of *Satureja boliviana* and multiple species of *Minthostachys*) as a chemical compound found in different endemic plant species, in ethno-medical, ethno-pharmaceutical and botanic texts *muña* is classified as a single botanical species with a complex of chemical compounds (Vandebroek et al. 2003 and Schmidt-Lebuhn 2008). The shift in classification from a chemical compound in multiple species, enabling substitution of species, to a single botanical species can raise the commercial value of the species in the marketplace, enabling accurate botanical classification, but at the same time putting the local species and endemic population of the plant at risk from over-exploitation. This factor is the primary difference between the internal system of Andean trade in medicinal compounds from plants and that of international and external trade of species with chemical compounds. In the internal system many species are common across wide regions, although they are only exploited where they are easily accessible and abundant and substitution often takes place. Medicine is classified by its chemical compound, represented by the properties when used for treatment, and not by specific botanical species, where local species take on the generic role in local classification systems.

This characteristic of the internal trade of a chemical pharmacopeia for the Andean natural medicinal market in Bolivia restricts over-exploitation of localised resources and retains low prices and value for plants, whilst creating high commercial value for the

medicinal compounds of the plant rather than for individual plant species. The combination of economic resource zones and ecosystems enables mapping plant distribution and chemical compounds in local and regional zones to find their relation and role in local and wider trade networks of Andes. In this system names are specific to a local plant species in local classification schemes for flora, while in the marketplace the same name refers to the chemical compound or shared property and not the specific plant species forming overlapping classification schemes. Understanding the social mechanism used to regulate and classify the plants species and chemical pharmacopeia therefore requires an understanding of the local taxonomic nomenclature and the specialist nomenclature used in marketplaces.

5.3 Andean folk nomenclature and medicinal plant classification

Folk taxonomy and systems of classification provide an understanding of the cognitive process used for the codification of cultural knowledge. The nomenclature used by Andean market stallholders provides an opportunity to study how the classification system for medicinal plants represents ethnobiological knowledge. Stallholders need to be able to communicate, often complex information, about the chemical and therapeutic properties of plants to collectors and to users. It would seem logical that their lexicon and classification system convey information on plants that relates botanic morphological characteristics to their therapeutic qualities and represents biological knowledge that relates ecology with distribution of chemical compounds.

Berlin's (1974) folk botanic taxonomy provides a useful model for terminology of folk taxonomic systems in general. Berlin described folk taxonomy in terms of levels or ranks where each level is a sub-division of the level above, creating a tree diagram. Following Berlin, the level unique beginner refers to all plants, the level life-form refers to the vegetative type; tree, grass or vine, although Berlin found these terms rarely form part of folk taxonomy. The categories of generic, specific and varietal are used to distinguish plants at the lowest levels. Berlin found generic, specific and varietal classifications in Teltzal nomenclature approximately reflecting the Linnaean classification system of botanic genus, species and variety, although folk varieties only occurred for cultivated crops. However, we should not assume a universal cultural

classification system and “in a single body of data there may be variation according to many criteria which are often cross-cutting and reinforce each other irregularly.” (Ellen 1979: 337). Plants may be classified or grouped as types dependent on their features, and classification structures can combine aspects of both taxonomic and type classification. In the marketplace the variation in naming and classifications for plants may not simply be regional, variation in naming, or error on the part of informants, but may form part of a complex and specialist classification system.

In Andean nomenclature the use of implicit sets of rules for naming and classification of plants have been recorded for cultivated crops (see Brush et al. 1981; Johns 1986) and for medicinal plant pharmacopeia (see Girault 1987; Roesch 1994). The nomenclature and medicinal uses of Andean flora for the southern Andean region of Bolivia have been documented in ethnobotanic inventories (Pestalozzi 1998; Marca Cáceres 1997; Fernandez et al. 2003; Vandebroek et al. 2003). In Oruro, specialist market stallholders use a clear nomenclature to classify medicinal plants, and plant parts. During visits, interviews and participant observation at the marketplaces it soon became apparent there was consistency in the nomenclature used and naming systems of naming for medicinal plants, but cases of inconsistency in naming for specific plants and particular groups of plants depending on the context of use. The cases of inconsistency provide a key to understanding variations in the underlying classification structure. In the marketplace the plant converts from being a plant used for medicine into a medicine from a plant. Stallholders relate names to medicinal properties of products through the context of use. Plant nomenclature used in the marketplace corresponds with folk taxonomy described by other authors for Bolivia and the Andean region (Brush 1981; Girault 1987; Roersch 1994). However there are a number of variations between the folk botanic taxonomy and the classifications systems used in the marketplace by specialist medicinal plant stallholders that enabled them to both identify plants and indicate their therapeutic properties.

Bertonio’s (1612) dictionary of Aymara provides descriptions of many of the names applied to both cultivated crops and medicinal plants in the central Andes. The majority of these names are still in use today. Although it is not possible to clarify if these are for the same biological taxa it does demonstrate a continuity in Andean ethnobiological

knowledge (Brush 1992, 2000). In describing ethnobiological knowledge of potatoes, Brush (2000) rejects the focus on representing indigenous knowledge simply through plant identification, and focuses on the social mechanisms found in Andean society. Brush, following Murra's (1975) theory of verticality, uses the 'cultural ecology model' to focus on 'the social mechanisms that determine management of heterogeneous landscape and provision of social units at the household level' (Brush 2000: 284). In the cultural ecology model complementarity forms the organising principle for Andean society and enables access and redistribution of resources spread across multiple ecological regions by a single ethnic group. The Andean social mechanism of complementarity and the cultural ecology model require definitions that define crops from different ecological and physical conditions of soils and the resulting potato varieties' properties and diversity. The use of Andean cultural beliefs of duality and complementarity form the underlying social mechanism, that enables the cultural ecology model which provides a basis to interpret the medicinal plant classification systems used by specialist Andean medicinal plant market stallholders.

La Barre (1947) provided the first description of Andean potato nomenclature for the Aymara of Bolivia. More recent studies of folk taxonomies for Quechua and Spanish speaking peasants of Peru follow La Barre in describing folk classification in terms of four taxonomic levels: genus, species, variety and subvariety (Brush 2000). The use of potato nomenclature is found across languages and the contemporary terms and taxonomy are also found in Bertonio's (1612) Aymara dictionary showing continuity of Andean nomenclature systems. Brush et al. (1981) identified four taxonomic levels used by Andean farmers to classify potato: folk generic, folk species, folk variety and folk sub variety. The generic term *papa* is used universally for all tuber-bearing *Solanum* species. At the genus level the *Solanum* tuber group *papa* or *akshu* (a local dialect) are distinguished from other Andean tubers (e.g., *Oxalis tuberosa* and *Ullucus tuberosa*). At the species level potatoes are grouped according to four folk species criteria: a) cultivation, b) edibility, c) processing, and d) frost resistance. 1) *akshu*: cultivated non-bitter potatoes with little or no frost resistance. 2) *shiri-akshu*: cultivated bitter potatoes which must be processed by freeze-drying to remove glycoalkaloids before eating; frost resistant. 3) *kurao-akshu*: edible, semi domesticated (uncultivated) potatoes found in mid altitude maize fields; no processing required and not frost

resistant. 4) *atoqpa-akshu*: unedible, wild potatoes; some frost resistant. While at the folk species level cultural divisions are clearly related to botanical species divisions (Brush et al. 1981), they also correspond to chemical composition linked to ecological regions and cultivation.

At the third level, folk varieties, potato classifications are based on tuber characteristics and distinguished according to tuber skin colour, meal colour and consistency, tuber shape and configuration of the 'eyes'. Some plant features, such as flower and stem colour are included in the naming system, but this is rare. At the fourth, and lowest taxonomic level, sub variety classification is based on secondary tuber characteristics, principally variations in tuber colour. Examples are *puca suito*, *yurac suito* and *yana suito* which have morphologically similar tubers but with red, white and purple skin colour, respectively. Below the folk species level classifications relate directly to the chemical composition of the potato and preferences of taste. At these two lowest taxonomic levels potatoes are grouped into named categories that constitute an intermediate ranking rather than separate taxa (Brush 2000). The intermediate ranks are labelled and usually group several varieties and subvarieties through a single criterion of use or ecology. These categories are of interest in medicinal plant classification.

The classification and exchange of potato varieties within communities and across altitudinal levels enable Andean farmers to maintain genetic diversity and to protect crops against disease. Andean potato classification shows a clear taxonomic structure that identifies potato botanic species, and correlates with the presence and concentration of chemical properties related to their bitter taste (Johns 1996). Folk species are defined by the relation between ecology, altitudinal range and cultivated or wild, with the presence of bitter properties, while intermediate folk categories at the varietal level group potatoes defined by their use, local ecology and form. It would seem logical that the nomenclature and classification system used for potato would be extended into other use categories, including non-cultivated crops and medicinal plants.

Girault's (1987) study of the Kallawayas healers of northern Bolivia recorded the nomenclature for 876 medicinal plant species from across Bolivia and demonstrated that the folk classifications directly related to classification of botanic species. Girault

identified two basic groups or types of words, and found that the second group are added to names from the first group to form a binomial to identify plants. These binomial classifications corresponded to the botanic genus and species. The first type of words used unique names with no other meanings and the second are specific criteria or adjectives and metaphoric descriptors. Girault grouped the secondary terms into two sets, ten general categories and eight specific categories used to classify flora by botanic characteristics.⁴ In the classification system recorded by Girault, the first term is used to identify the folk genus and to classify a folk species within the folk genus. The data also present numerous cases where folk botanic genus includes plants from different botanic genera. This suggests that folk genera relate to the uses or the properties of the plants where the singular word, folk species, is a specific type, property or feature which other plants in the folk genus are compared against. The use of these naming categories indicates they are a certain type, with the same classification structure that form the intermediate ranks of ecology and use, used as varietal and sub variety in potato classification described by Brush et al. (1981).

Roersch's (1994) study of Andean nomenclature for over 509 botanic species of medicinal plants used by Quechua and Aymara speakers in the south Andean region of Peru, corresponds with Girault's findings in demonstrating that folk binomial classification for medicinal plants aligns with botanic genus and species. Roersch identified what he refers to as five folk levels used for the taxonomic classification of medicinal plants. Unlike Girault, who collected plants with specialist healers, Roersch worked with multiple informants and in marketplaces to collect his data. Roersch highlights cases where plants from multiple botanic genus and family are found in a single folk genus and extends these to explain folk levels of taxonomic classification.

⁴ The ten categories identified by Girault (1987) and the number of terms in each category are as follows: a) Sexuality: *china* (female), *orko* (male); b) colour: ten terms; c) botanic: seventeen terms; d) ecological: ten terms; e) dimension: five terms; f) flavour and quality: fifteen terms; g) particular metaphors: twenty seven; h) of human inspiration: twelve; i) of animal inspiration: eight, and j) words specific to Kallawayá or Spanish: three. Girault's data identified eight further categories of terms used to classify flora by botanic characteristics; five floristic, six ecological, six by dimension, seven colours, five taste and scent, one animal *alco* (dog) and one historic people 'Inca'.

The first level encompasses the unique and generic names without any specific meaning. The second level of classification is defined by adding a folk classification of sex or colour forming binomial names. In the third level or group, a second name is added to the first level name to express a characteristic of place, form, use or habitat. The fourth level of classification was attributed to folk varieties by combining a third word to classify the second level. For Roersch, the fifth classification level is the use of hot, cold and temperate to classify plant qualities. This characteristic is denominated separately to the plant name and it is not clear how these classifications refer to specific therapeutic properties of the plant, or a plant with multiple therapeutic properties. I argue that folk classification for medicinal plants used by stallholders in the marketplace is a specialist classification, that combines the taxonomic structure for folk species based in ecology with varietal classification that groups plants based on their properties and medicinal uses.

Although at first sight there are similarities in the taxonomic structure of the classification of medicinal plants described by Girault (1987) and Roersch (1994), the pharmacopeia I recorded for the marketplaces of Oruro, and the folk botanic taxonomy described by Berlin (1992) for the Tzeltal in Mexico, they are distinct classification systems. Each system is based in the context of use. Berlin describes the taxonomic classification for plants based on morphological features by a remote agricultural community. The ethnobotanical studies of medicinal plants by Girault (1987) and Roersch (1994) use botanic taxonomic classification as the basis; to confirm the classification of the plants, and the humor to distinguish the plants therapeutic properties. The studies do not indicate if regional or local variation in ecological and chemical properties are incorporated into the classification, as described for the cultivated crop potato (Brush 1981; Johns 1996). A folk botanic taxonomic classification system does not fully explain the use of a single term to describe a folk species or how it is incorporated as the common characteristic of which the other folk species are a type. The distinction between plant and part cannot explain all cases from my interviews, where a single plant had several names in the same language, because different parts can have different medicinal properties. The chemical composition of plants and in turn the properties for treatment, varies according to stage of growth, plant

part, and local ecological variations that would require a nomenclature to include and relate to a chemotaxonomy of plants.

A chemical based classification, where plants with the same compounds and treatment outcomes share the same folk genus and variation, or absence of the properties, and composition are indicated by the second and third level terms, provides a better way to explain the classification patterns for Andean medicinal plant classification and those I recorded in the marketplace. The market stallholders of Oruro identify plants and plant parts based on their morphological appearance. I propose that the classification system indicates the chemical properties and therapeutic qualities to differentiate and classify the objects as medicine, and combine plant species and use with chemical ecology. Stallholders need to be able to differentiate between material with the presence and absence of chemical qualities and the strength or concentration of those properties in a plant or in a specific plant part. The classification system used by specialist stallholders also needs to be able to adapt to substitution of plant species and may indicate how or when plants need to be used together. I argue that medicinal plant stallholders combine botanic and chemical knowledge of plants into a chemotaxonomic based classification system, and not a purely folk botanic taxonomy. In this classification system the first term refers to therapeutic properties and the second terms used i.e. colour, indicates characteristics of presence and strength of chemicals. To further understand the chemotaxonomic classification requires analysis of how each set of terms are used in the context of the plants medicinal use.

5.3.1 Medical plant classification by specialist market stallholders

Market stallholders in Oruro speak and use the Quechua, Aymara, and Spanish lexicon as the basis for nomenclature and classification of their medicinal plant stock.

Classification of medicinal plants involves single terms, two terms to form binomials and three terms to form trinomials. Names often combine languages. For example, the folk variety *wira k'oa hembra*, a resinous bush from the Altiplano used for healing and offerings of the botanic genus *Baccharis* or *Parastralephelia*, combines all three languages: *wira* (Quechua), *k'oa* (also spelt *q'owa* Aymara) and *hembra* (Spanish).

Understanding the meaning of words forms only one part of the classification, while the

significance and use of each of the three words in the classification structure holds other information. *K'oa* is the generic folk category for resinous bushes used in Andean offerings and links the botanic species with a chemical property of the resin resulting from the ecology they grow in. *Wira* refers to a specific botanic species with a specific use within the folk category of *k'oa*. The term *hembra* indicates the taxonomic rank as folk or variety as it is the third term used, and refers to the strength of medicinal property. Understanding how aspects of the classification relate to different uses of the plants requires experience of both uses and the morphology of plants. Matching plant material to names and uses requires interpreting the classification structures and categories of use.

Andean plant species from different botanical families with similar morphology have been found to have the same products of secondary metabolism, including fats, oils and resins, as the result of a common adaptation to environmental constraints (García and Beck 2006). This helps to explain how Andean ethno-taxonomy and classification of medicinal plants into folk genera can be based on the presence of chemical properties and / or morphological features. Examples include the folk genera *k'oa*, *muña* and *tholar*, from the botanical family Asteraceae (described above) and the genera *Baccharis*, *Loricaria*, *Fabiana* and *Parastrephia*, all resinous bushes with medical properties. The folk-species *wira wira* (Quechua), used for coughs, encompasses multiple plant species in the genera *Gnaphalium* and *Achyrocline*. The folk-genus *itapallu*, (Quechua), are plant species with stinging hairs and compounds which irritate skin causing a localised urticaria (a raised, itchy rash that appears on the skin typical of stinging nettles), they are typically used for rheumatism and from the botanical genera *Cajaphora* and *Urtica*.

Folk nomenclature used in the marketplace of Oruro involves three forms of renaming: 1) replacing local plant names from different languages with names in Quechua, Aymara or Spanish used in the marketplace; 2) replacing specialised local names in the same language for common local names used in the market place; and 3) incorporating local names into specialist bi- or trinomial classifications of folk nomenclature used in the marketplace. Widely known unique names were kept for exotics but local names were added and used in classification structures to form compound bi- and trinomial names as for the example of *wira k'oa hembra*. On entering the highland marketplace

traders substituted plants' local names used by lowland tribes for Quechua, Aymara and Spanish names. Stallholders or merchants often did not know lowland plant names in local languages, and they considered these to be simply names and not to have wider cultural significance outside the local area of use.

Exotic plants introduced from Europe from the 15th century onwards, first by Colonial Spanish (e.g. *romero*, rosemary; *cebado*, barley) and more recently through government development projects (e.g. *Eucalyptus species*), retain their Spanish or exotic names as unique identifiers within the marketplace and local communities. These also formed adjectives and metaphoric descriptors used in binomial names in the marketplace classification structures, e.g. *Romero china* (*Romero officinalis*) a folk variety of Rosemary. *Romero*, being Spanish for rosemary and *china* being Quechua for female, refers to the specific characteristic of the plant. Spanish names are also used as adjectives in binomials to classify native species. *Pampa romero* (*Quinchamalium procumbens*) is a local common name used in Quechua-speaking areas of Oruro and has also been recorded for the eastern valley of Cochabamba by Vandebroek, Thomas and AMETRAC (2003). *Pampa romero* literally means *romero* from the *pampa* (Quechua: 'open plain' or grassland). The plant has only a superficial morphological resemblance to *romero* (rosemary: *Romero officinalis*) as a bush and in the shape of the leaves, although not for its uses. Here an exotic folk specific taxonomic classification has been incorporated into local classification structure forming a binomial specific classifier. The use of the word *pampa* denotes the wild rural origin of the native plant, and is used to prevent confusion with 'true' rosemary that is cultivated around homes. Unlike the first example the binomial refers to a botanic and folk species of wild and cultivated forms and not a folk variety of a botanic species, and not a hierarchical classification structure.

Unlike the natural environment, the marketplace provides plants as whole plants and as parts of plants, and single species from different stages of growth and with different forms of processing or treatment that alter the chemical composition. In this sense each plant 'object' needs to be compared against other objects of varied origin, including mineral, animal, man-made objects, and parts of plants available in the marketplace. I use the term 'plant' to refer loosely to a vegetative mass in whatever form: whole, crushed or part. Freeing ourselves from a purely taxonomic botanical foundation and

classification structure enables us to begin to establish limits as to when a plant is classified as a plant in its natural growing sense, and when it is a pharmacological compound or medicine. This definition between plant, plant part and chemical compound, also helps to explain why a single plant can have several names in the same language, in the same way that different parts can have different medicinal properties. Maize is an example of a plant whose parts have unique names. *Cabello de choclo* (Spanish: hair of cob) refers to the elongated stigmas of the maize cob that are used as a diuretic in folk medicine. The maize cob and kernels have a diverse set of classifications that combine colour and form and relate to regional varieties and forms of use. In an ethno-pharmacopeia we would expect to find multiple botanic species with the same chemical to have a common folk name and plants with multiple uses to have multiple names.

Medicinal plants were described or named using single words (e.g. *Chachacoma*), two words (e.g. *Santa Maria*) and in Quechua reduplication is common (e.g. *Sanu sanu or wira wira*). Matching names to predefined folk or botanic species was not always practical, however, plant names provided a reliable form of comparing classification structures and selection criteria used for medicinal plants. There are many cases where I could not match folk names to single botanical species, as they were both specific and generic terms referring to multiple botanic species used for an illness, and varied for botanic species between regions and people. An example is the uninominal folk specific *chuchuwasí* used in La Paz for the hardwood tree fern *Cyathea amazonica* over five metres high, as well as for *Cyathea pungens*, and other *Cyathea* species, four metre high tree ferns with soft pulp and abundant white sap. In Oruro *chuchuwasí* refers only to the wood from the hardwood tree over five metres high with little or no sap, and *helecho* (Spanish for fern) is the unique name for *Cyathea species*. Here the generic Spanish name for fern, *helecho*, is used as a folk specific for the medical plant in the marketplace in Oruro. Listing or assigning folk botanical names to species can be equally problematic. As in the example, listing *Cyathea* species with the folk names *helecho* and *chuchuwasí* is a true, but equally misleading reference, as this is only relevant to where the name is used. It is only in the medicinal plant market of Oruro that *chuchuwasí* is a folk specific for hardwood tree ferns over five metres high, while in La Paz it is a folk generic for all tree ferns of the genus *Cyathea*. Vice versa, in La

Paz, *helecho* is the folk genus for all ferns and only *chuchuwasi* is specific to those with medicinal properties.

Life forms are distinguished in Quechua and form part of classification structures used for medical plants: *sacha* (tree), *jichu* (grass), *tolar* (Andean resinous bushes), *willku* (vine), and *chunta* (palms). ‘Herbs’ and ‘cacti’ were covert life forms without names, informants distinguishing characteristics for low shrubs without woody parts or cactus as spiky and columnar plant without leaves. Marketplace stallholders used the Spanish term *planta* (plant) when referring to medicine elaborated from plants and plant medicine. The category of ‘medicinal plants’ is a social construction of the domain of medicine and types of plant used in medicine; it is not a clear sub category of the unique beginner ‘plant’. Many plants sold for healing were not considered medicine, but ritual plants, although they were used to cure illness or provide well-being, creating two cross-cutting use categories.

The nomenclature used by market stallholders to classify plants took three forms: 1) single words; 2) secondary terms, e.g. plant gender and colours added to single terms; and 3) specific therapeutic properties, i.e. humour. Outside of strict folk-taxonomic nomenclature, stallholders used several other classificatory devices that included metaphors that related to plants therapeutic qualities. In the marketplace words used to identify life forms were also used to identify specific products or folk categories. *Sacha*, the generic life form ‘tree’ in Quechua, was also the unique identifier for the bark from a single botanic species in the medicinal mixture known as *kuti mesa*. In the marketplace, the spines from the *palo santo* tree are named *espina* (spike). The naming system did not classify these as a spike of the *palo santo* tree, but by used them as unique identifier. Stallholders explained that the spike has one use and the bark of the tree another. The bark of the tree was not referred to using a unique identifier but as bark from *palo santo*. Plants with *kichka* or *espina* are rated for their medicinal properties, in particular for use against coughs. At the same time it is recognised that not all plants with spikes are medicinal and not all spiky medicinal plants are good for coughs. The uses of spikes as a metaphor for some species’ medicinal properties creates a mnemonic, reinforcing a common characteristic for a sub group of individual species within and across botanic genera that are not part of the lexical classification for

plants and do not follow folk taxonomic structures. Plant names can identify species and their properties or use; e.g. *chanca piedra* (*Phyllanthus niruri*), ‘rock breaker’, describes the plants’ location in cracks of rocks and its medicinal use for breaking down kidney and gall stones. Market stallholders classified wild species of grasses of non-specific use using the folk term *paja* (Quechua). Stallholders also used *paja* as a metaphor for plants with weak or no medicinal properties. When presented with poor quality or bad plant material, it was classified as *paja*, to describe the plant as having the inert medicinal properties of grass. The term *pampa* (Quechua) open plain, was also used by market stallholders to indicate the inferior properties of a specific variety of folk species of medicinal plant. The term was used to refer to the use of inferior quality products from rural zones, indicating barren land, and poor quality. Neither of these forms of classification are the norm for medicinal plant classification. This highlights that each word can have different meanings and each classification needs to be understood in the context they are used.

Natural classification would limit the folk name to a list of species or species with physical characteristics, while a medical-based classification would limit classification to the description of the plants’ medicinal effect and not form. These two distinct classifications provide a rich set of cross-cutting categories that can be explored by the transformation and contextualisation of names from local specialist folk ‘botanical’ to the specialist ‘medicinal’ use of the marketplace represented in synonymous and bi- and tri- nominal classification groups. Synonymous names appear for plants which are not botanically related. Names in this group are distinct from the previous ones as the names are well known and used across multiple locations and languages. Examples are the Spanish *romero* (rosemary) and Quechua *pupusa* (*Werneria species*). Other cases provide names in both Quechua and Aymara for folk genus. An example is *itapallu* (Quechua) or *kisa* (Aymara) both used to describe the same folk genus including the species *Cajaphora* and *Urtica species*. Classification of medicinal plants requires an understanding of the underlying medical use categories used to form generic properties of folk pharmacological genus. Plants are used in mixtures (compounds) and individually (simples), for physical biomedical, psychological / social categories. To unravel these classifications requires looking at first the aspect and form of the classification system, then how plants with multiple medicinal use categories are

named.

5.3.2 The use of gender as a metaphor to classify medicinal properties

Studies recording folk taxonomy for rural Aymara agricultural communities (Pestalozzi 1998), and for Quechua communities in southern Peru (Roersch 1994), both indicate the use of ‘sex’ or gender in folk classification for plants that relate to colour, flavour, size and texture. Dark, bitter, larger plants or straight, hard and coarse features are considered to be masculine *macho* (Spanish) or *orko* (Quechua), while lighter, less bitter, smaller, round and smooth features are feminine *hembra* (Spanish) or *china* (Quechua). The adjective is added to the generic folk specific name forming a binomial, the gender is a suffix in Spanish and a prefix in Quechua, e.g. *wira wira macho* (Spanish) or *orko wira wira* (Quechua). The use of human characteristics of gender to differentiate plants is not universally applied and not restricted to folk botanic species or levels of classification (Wilkin 2006 and 2008, 2009). I found variations in how gender was used across folk genera and botanic genera for plants with common medicinal use. This creates a category with overlap of both botanical and medical classification. Examples for purely folk classification for species exist in local communities (as shown above) but in the marketplace I found the classification of male and female to be used to distinguish variation in folk species’ medicinal potency.

Pointing to the upper plant parts of one species (*Ganaphalium species*) for sale in the market and asking ‘what is it called?’, I received the reply: ‘*Wira wira para tos*’ (*Wira wira* for cough). The basic information, plant name and use is provided without a cultural context. I recall my Quechua lessons and the meaning of *wira* as ‘fat’, and fat as a metaphor for ‘life energy’ and health in ritual cures. In further interviews with traders I found no relation to the plants’ physical form or use that related to western or Andean concepts of fat as a morphological feature of the plant or its use as medicine or the plant’s use in ritual cures. This demonstrates firstly that not all names are representative of plant’s physical characteristics or medicinal uses and are simply names until they are placed into a socio-cultural context. The reply to the question ‘what is this called’ provides a name for an object, a plant in the marketplace. Without reference to the names’ use and context as a medicine or a natural classification, or to the relation to other plants, it is just a name.

The traders' response shows that the plant can be used for the cough but not that the classification is in the context of a plant or medicine. Pointing to another *Ganaphalium species*, a plant of similar appearance on the same stall and asking 'what is this called' the reply is *wira wira*. The seller then clarifies that this is *wira wira macho*, the first was *wira wira hembra* pointing to the more fleshy greener variety. She then explains that the dryer darker *wira wira* is from the higher regions, it is *macho* and more potent; the other light green plant with soft feminine characteristics is *wira wira hembra* is not so strong and better for children. The combination of languages, Quechua and then Spanish, to describe the plants' properties do not denote the context or cultural meaning. The use of Spanish words have equal cultural significance to the Quechua words *orko* (male) or *china* (female). Traders would switch between Quechua *china* and Spanish *hembra* for a plant. This swapping of language for traders did not change the cultural significance of the word from one language to the other. Matching the name to morphological features to distinguish a plant is equally used to define properties. The provision of a binomial does not imply its use as a medical or natural classification, but as a variation in the medicinal characteristics. This demonstrates that adjectives are used to distinguish plants that vary in their medicinal properties.

In this context, the plants gender as 'female' or 'male' acts as a metaphor of the plants' morphological characteristics and the potency or strength of its chemical properties. Another common example of the use of the gender metaphor for a plants' morphological and chemical potency is *Eucalyptus*. *Eucalyptus* tree leaves are well known for their ability to clear colds and are a popular and readily available product. The tree itself has two forms of leaf. When young, the first leaves are round and the essential oil is low in camphor content which gives it its distinctive smell and medicinal properties; while the second set of leaves are elongated and have a higher camphor content, noticeable by their pungent smell. The long straight leaf is recognised for its strong male characteristics while the round leaf is recognised for its female characteristic, following the potency of the plant part. This contextual adjectival and metaphorical classification is used for potency of parts on a single plant. This demonstrates how binomial classification is used by traders in the marketplace to distinguish between plants' chemical potency and is not simply for classification of folk species or varieties. While male and female characteristics are used to differentiate

medicinal potency between plants in the marketplace, local ‘supply’ communities use the classification to identify plant species. Not all folk species are classified as female and male by stallholders in the marketplace. This suggests the classification is linked to specific characteristics related to the selection and properties of specific plants when used as medicine.

Specialist stallholders who prepared mixtures of plants for teas and for Andean healing ritual *mesas* emphasise the need to have both female and male to balance the mixture and for the mixture to be complete or whole, *completo*. This complementarity concept provides the link between natural and medicinal classification and culturally enforced interpretations of efficacy. In pharmacological terms, the classification links the physical characteristic of the plant to a specific form and enforces the diversity of species and chemical qualities. The use of male and female and *completo* for natural mixtures is described in chapter 8. It is important to highlight here how classifications are related to how plants interact when used in combination and are not related solely to the plants as individual elements.

5.3.3 The use of colour to classify medicinal properties

The classification by colour was made independently of the classification of colour for attributes of plant sex or gender and the corresponding species. Colours referred to flowers, tubers or other plant parts used to differentiate between folk species that related to botanical species by non-specialist in the marketplace, agreeing with the findings of Roersch (1994) for southern Peru. Examples of folk species are *amapola blanca* (white poppy) (*Papaver somniferum*), contrasting against other *amapola*, *floripondio roja* (*Datura sanguinea*) (red) against white and tri colour *floripondi*, *ortiga roja* (*Urticaria species*) red, against *ortiga amarilla* (*Cajaphora species*) yellow, and *rosa blanca* (white rose) (*Rosa centifolia*) which differentiate the red from the wild rose. The colours did not only relate to classification of species, and market stallholders emphasised how colour related to distinct properties or medicinal strength of each species. Colour was also used to classify folk varieties formed of multiple botanic species with a similar morphological form, chemical composition and use. The tuber of the folk genus *sarzaparilla* (various unidentified species of vine) were classified into

folk varieties based on tuber colour (orange, white and light green) which in turn represent variation in medicinal uses and potency.

Resins are also classified on the basis of their colour: *Copal*, amber colour (*Hymenaea courbaril*), *inciense*, white (unidentified species); and *myrrh*, black (*Protium copal*), although in the marketplace their colour and appearance take on another classificatory role used by specialist market retailers, not previously recorded in ethnobotanical literature nor used by suppliers. The classification used by specialist stallholders or healers, referred to the resins' 'quality' for use in offerings or for cleansing rituals. The quality and form of an offering which is burnt is measured by the colour of the smoke, white smoke has a very high value. The folk generic *inciense* is classified into the two folk specifics based on colour: *inciense blanco* (white incense), is contrasted with *incense* and denotes the higher quality and purer resin. Both resins are from the same tree species and ecological region. The retailers sift through the bulk material of resin supplied to the market and sort into the two colours, white and grey. *Inciense blanco* (white incense), also known as *inciense de gloria*, has a higher price and is recognised for the pure white smoke it produces when burnt. Incense resins and *k'oa* plants are both burnt to cleanse illness, and both have been reported to have medicinal properties which are activated when burnt. The classification by colour suggests a correlation between plant properties measured in the colour of smoke and the attributes of the plants. These results demonstrate that specialist medicinal plant stallholders use specialist classification which do not always follow botanic taxonomic or a hierarchical classification structure. Colour terms used in folk classification identify botanic species and varieties with similar properties or variation in chemical properties of plant species, within plant material from a single species or from a single plant.

5.3.4 Local and commercial contexts of medical plant classification: K'oa, Thola and Muña

The folk terms *k'oa* (in Aymara spelt *q'uwa*), *thola* and *muña* refer to specific properties, uses and species of a resinous bush of the Altiplano. The folk terms refer to well known use categories: *k'oa* for rituals, *thola* for combustion and *muña* for digestive properties, although the botanical species to which these terms refer vary between regions. *K'oa*, *thola* and *muña* are all readily available from market stalls and each can

be defined by its distinct aroma, although their distribution in the environment is not uniform. *K'oa* is associated with a pungent sweet musky scent that fills the air on the first Tuesday of every month when Andean people *k'oar* ('burn the *koa*', a mixture with the *k'oa* plant as its base) for good luck. *Thola* is known for its distinct sweet aroma, when it is burned as firewood, notably for the annual *fogata* (bonfires) for San Juan (Baptist) on the 23rd of June, and for its use in wood fired bread ovens which are common throughout Oruro. *Muña* is used as a condiment in food and recognised for its digestive properties and minty scent. Although each use term is treated as a folk species, there are a number of folk species for each folk generic and overlap between plant species and categories of use enable analysis of folk species with complex of botanic species and multiple use categories.

Although folk specific and generic characteristics of *k'oa* are widely known, other botanical species in the genus are only known locally or by specialists.

'The generic name of "Koa" is used for resinous bushes which, when placed on *brasas* (small wood burning stoves), produce an aromatic smoke. The practice of "koar" or produce 'sahumerios' with these plants, The most common "Koa", is called "Huir-Koa" (Wira K'oa) which is seen in all the stalls of our markets selling medicinal herbs and amuletos' (Cardenas, 1989: translated by Author).

The folk term *k'oa* is used to describe resinous bushes of the *puna* region used for ritual offerings and for illness, including stomach ache and mild respiratory problems in rural areas. Each use arises from a distinct context and classification. The upper parts of the plant, branches and leaves, are used and material with flowers is rare in the marketplace. When asked to list all the different kinds of *k'oa* they knew specialist traders in the central marketplace of Oruro who consistently listed three folk specifics that correlated to botanic species whose primary use was for *mesa* ritual offerings and healing mixtures, confirming these are all the different *k'oa* and are used in *mesas*. *Wira k'oa* has sticky resinous small flat leaves that splay out from the stem with a deep musky sweet scent. *Kille k'oa* and *t'ika k'oa* have branches with scale-like leaves which wrap around a woolly resinous branch. *Kille k'oa* has a flat appearance with the leaves pressed against the branches and is sticky with resin that has a soft musky sweet scent.

T'ika k'oa has a round form with the leaves pressed round the branches, is less resinous and has a softer musky medium scent.

Table 4. Knowledge distribution of the folk species *k'oa* and their uses for medicine and ritual.

	Medicinal use category: Plant classification	Medicinal use knowledge	Ritual use category: Plant classification	Ritual use Knowledge
Rural harvester Non specialists	Binomial classification of species.	Knowledge of local plant uses.	Only local species identified using binomial names.	Use of folk genus <i>K'oa</i> known. Some knowledge of folk species use.
Urban consumer Non specialist	No clear identification of species.	Uses known for single term plant name.	Only one common <i>K'oa</i> species identified.	Use of folk genus <i>K'oa</i> known, specific species uses unknown.
Marketplace stallholder Specialist	Binomial classification of species.	Knowledge of multiple regional plants.	Clear trinomial classification of folk species and varieties.	Clear knowledge of folk species and varieties forms and uses.

Two folk varieties of *wira k'oa* were only identified by traders, *wira k'oa de Peru* (*Parasphelia lucida*), and *campo k'oa* (*Lepidophyllum quadragulare*). The addition of the geographic origin of country and countryside are used to differentiate the two botanic species. Their appearance was a lighter form of the true *wira k'oa* species, their scent was less pungent and they were more sticky with resin. Traders sold this as a low value *wira k'oa*, or mixed with genuine *wira k'oa*, and was thought to produce a poor quality of smoke. However it was a suitably priced substitute for genuine *wira k'oa* (*Diplostephium cinereum*) which only came from Chile, was in high demand, expensive and limited in supply. Chile had introduced restrictions on harvest and import tax that had pushed up the price and reduced stocks of *wira k'oa*. The use of the third classifier *de Peru* ('from Peru') adds a folk variety rank based in quality, while *campo* refers to the plants' rural origin and indicates a poorer quality substitute based in social class of rural origin.

The primary use for *k'oa* in the marketplace was the *mesa* offerings. It required further questioning, prompting with names and specimens to confirm knowledge of *muña k'oa* and *campo k'oa* with folk specific names and medicinal uses from the market

stallholders. Non-specialists I questioned about *k'oa* listed two species within the local folk generic *k'oa*, and the folk specifics *muña k'oa* and *k'oa thola*, or *campo k'oa*, recommended for stomach ache and respiratory illness. Non-specialists needed further questioning and prompting with specimens to identify *k'oa* with ritual use, *wira k'oa*, although *kille k'oa* and *tika k'oa* were not well-known. This demonstrated a distinction between common and specialist stallholders' knowledge and separate classification systems and use categories of medicine and ritual. While both groups knew the other plants from the second use category they considered these as a secondary and separate category only listing plants in a single primary use category. The data show that the use serves to contextualise classification of plants. This explains one form of the often contradictory classifications of the same botanic species with multiple names, or variation of a single name in different use categories. Further investigation would be required to reveal ecological contexts of folk classification for the plants which form the folk category *thola*, 'resinous bush'. The results indicate that the first name forms a general use category and the second a secondary use category. The combination of names can indicate the potency of particular chemicals found in the species.

The supply of medicinal plants and maintenance of the stock of Andean pharmacopeia in a market stall combines local plants from local markets and those collected on special harvesting trips by specialised suppliers and from multiple external market regions by merchants through annual markets. In contrast to the case of *muña*, where multiple endemic species have common chemical properties and are available locally, the complete Andean pharmacopeia includes several localised endemic plant species with no alternatives or substitutes. By comparing the different uses of plants in local pharmacopeia and their commercial use in the pharmacopeia of marketplaces in Oruro, the social mechanisms and cultural systems used to counteract monopolisation of supply, price-levelling and overexploitation can be traced or elucidated.

5.4 The high Andean region: Common flora and endemic species in ritual mixtures

The biogeography of the high Andes corresponds to the *puna* region, with an average altitude above 3,600 m.a.s.l., defined locally by its climate and vegetation. The region is formed from the central Andean plateau and the eastern and western cordillera. The

flora, ecosystems and ethnobotany of the *puna* has been described by García and Beck (2006). The high Andean region has over three hundred plant species that are used for medicinal purposes (Guiralt 1987). The region is divided diagonally from northwest to southeast, forming two broad ecological regions: a) warm humid northern, and b) dry cool southern and western regions. In Bolivia, the *puna* forms four geographic sub-ecological zones: the semi-humid northern plateau, the cooler semi-arid southern plateau, the humid eastern mountain environment above 3,800 m, and the dry mountain plateau above 3,800 m, formed from the western cordillera of Oruro (Ibisca et al. 2003). The research site of Oruro is located in the southern plateau and corresponds to the region of semi-arid *puna*. The department of Oruro's territory incorporates areas of all four of the high Andean region's ecosystems and the vegetation is characteristic of a high mountain semi-desert (Zeballos et al. 2003). While some plants are common, others require special trips to collect or can only be accessed through interregional trade. Pestalozzi (1998) recorded 298 plant species for highland pasture communities in the southern *puna* region east of Oruro, of which 94 were used locally for medicinal purposes. My collection for this study found only 29 of these species were commercialised in the market stalls of Oruro city. Nineteen consisted of upper parts of herbs, five were resinous bushes, two were vegetative parts of trees, two were cacti and seven were engorged roots of creeping herbs.

The cold climate, high incidence of solar radiation and high evaporation rates, combined with prolonged periods of drought and frost during the year, has defined plant adaptation strategies and the chemical compounds found in the *puna* region (García and Beck 2006). Plants have developed a number of chemical alterations and secondary metabolites to help prevent evaporation, protect against freezing and discourage consumption by herbivorous animals. These include production of resins containing essential oils, terpenes, flavonoids and sugars, principally sucrose, that form a protection against freezing. Some Andean plants also use anti-oxidants to prevent oxidation caused by high radiation and lack of water (ibid 2006: 59). These chemicals form an important part of the Andean materia medica. The terpenes include essential oils with antibacterial properties, such as camphor used for respiratory illness. The flavonoids have low toxicity, form part of human diet and have been shown to have anti-inflammatory, anti-microbial and anti-cancer activities (ibid 2006).

My study found some 120 species from the high Andean region were sold for their healing properties in Oruro city. Important families and genera were Asteraceae (*Achyrocline*, *Gnaphalium*, *Senecio*, *Werneria*, *Mutisia*, *Parastrephia*, *Sonchus*, *Werneria*); Lamiaceae (*Lepechinia*, *Clinopodium*, *Menta*); Leguminosae (*Adesmia*, *Lupinus*); Loasaceae (*Cajaphora*); Malvaceae (*Nototriche*); Plantaginaceae (*Bourgueria*, *Plantago*); Rosaceae (*Rosa species*, *Rubus*, *Polylepis*); Scrophulariaceae (*Calceolaria*); Solanaceae (*Cestrum*, *Solanum*); Valerianaceae (*Valeriana*); Verbenaceae (*Junellia*, *Lampaya*, *Verbena*, *Aloysia*); Cactaceae (*Opuntia*); Apiaceae (*Azorella*, *Mulinum*); and lichens. Products from native trees of the high *puna* that are sold for healing properties are *queñua* (Aymara: *qiñwa*) (*Polylepis species*), *khantuta* (*Cantua Buxifolia*), and *kiswara* tree species (*Buddleja*: *B. coriacea* and *B. tucumanensis*), which grow around urban areas and are popular medicinal remedies commercialised in the local marketplaces. Lichens are also used for medicinal purposes and I found three unidentified species sold in local marketplaces.

Exotic species include European herbs grown around households and in urban areas, notably *Rosmarinus officinalis* (rosemary), *Spartium junceum* (Spanish: Retama), *Salvia* species (English: Sage), *Ruta graveolens* (Spanish: Ruda), *Ocimum basilicum* (English: Basil), *Origanum vulgare* (English: Oregano), *Matricaria recutita* (English: Chamomile). These herbs were introduced in the 17th century by the Spanish and are used as both household remedies and as condiments in cooking (Jannia and Bastien 2004), and have been incorporated into Andean health practices and beliefs. Rosemary and *Retama* are used in cleansing rituals and have symbolic significance when used as part of offerings to *Pachamama* for prosperity, agriculture and health. The plants themselves are considered to protect houses from ‘bad’ spirits and their scent acts as a natural aromatic pesticide and fumigant. More recent additions to the Andean medicinal flora include *Eucalyptus* (*Eucalyptus globulus*) found growing close to rivers and near houses in most Andean villages. The leaves of the tree, which have a high essential oil content, with anti-bacterial and anti-viral properties, are commercialised in marketplaces for respiratory illness. The trees are also revered for their ‘protective’ properties from bad spirits. In the valley regions, *Eucalyptus* trees have been shown to reduce the prevalence of the lice that carry the deadly *chagas* disease (Bastien 2002), verifying folk beliefs of plants’ spiritual protection from illness with a biological explanation.

The common herbaceous plants and trees found close to homes, in sheltered areas along river banks, on agricultural parcels, fallow or pastoral land, are supplied to weekly markets by subsistence farmers. The plants form part of household subsistence strategies, they dominate local market inventories of fresh seasonal produce, and form the basis of intra communal and inter regional exchange between communities. Specialist traders and retailers purchase from multiple suppliers and maintain a stock throughout the year by drying the local seasonal flora that is both abundant and very economic. They also act as local bulking agents who then trade in bulk for products from other market regions.

Chemical compounds concentrated in pockets of abundant vegetation and endemic species created by localised environmental niches require a specific trip outside daily activities to collect. Plants located over a days walk or drive away from communities, are not supplied regularly to local markets but are traded at annual markets held in the Altiplano. Of note are the annual markets of Huari (see chapter 7), Oruro city (see chapter 8) and Ramos in La Paz. The principal endemic medicinal compounds of the *puna* are concentrated in the ecological niches of thickets of resinous bushes known as *thola*, in high altitude plants above 4,000 m.a.s.l., and around wetland found in the outer cordillera. Variations in the complex of compounds of the resins in the *thola* are created by the regional climate forming localised endemic species and concentrations of specific chemicals both which are sold in marketplaces across the Andes. The thickets also support an understorey of herbaceous vegetation used as medicine and form an important habitat for insects that process chemical compounds of flora including ants and lone wasps, whose by products are also sold for their medicinal properties.

Medicinal plant parts from the Andean region contain specific groups of compounds sold for specific uses in the marketplace. Andean plants are also sold for diarrhoea, stomach ache, colic, cleansing and protection from ‘bad spirits’, and offerings for agricultural cycles, good health and others in marketplaces. Common herbs of the high Andean region are sold in markets for common illness; coughs, stomach ache, bruises, wounds, used as expectorants and for chest infections including tuberculosis. The properties of high Andean plants have a reputation for their efficacy in treating respiratory illness, one of the most popular and well known plants used is *wira wira*

(*Werneria* and *Gnaphalium* sp.). *Wira wira* is used as a folk and household remedy for the common cold and cough, and the plants can be found in herbal markets across the Andean regions throughout the year. Following studies which have confirmed the plant's medicinal properties (for a recent example see Bueno-Sánchez et al. 2009), *wira wira* has been commercialised through the cottage industry of natural healers, as tinctures and cough syrup, and by Bolivian pharmaceutical companies who produce syrups and cough medicine using *wira wira* plant extracts, that are sold in pharmacies across the country. While traders in Oruro's marketplaces knew individual plants used for coughs or chest infection, they would typically recommend a mixture of plants. Combinations of plants with the folk species *wira wira* (*Werneria* and *Gnaphalium* sp.), and *Eucalyptus* leaves were sold as mixtures that formed complex medical compounds rather than the individual compounds of the individual plants. Flowers also provide an important source of chemical compounds: *tani tani* (Quechua for red and yellow in a single plant, and folk specific for the botanic species *Gentianella primuloides* flowers), various colours of tubular flowers from *khantuta* (*Cantua buxifolia*) and *violeta de los Andes* (*Malva* sp.) flowers are all standard stock in medicinal plant markets and sold for coughs. Again, while the properties of the flowers from an individual species were known, they were typically prescribed to be used as part of a mixture for coughs by traders in the marketplace. While not endemic or rare, the combination of flora in mixtures does enable a broader range of treatments for possible illnesses resulting from unclear diagnosis of coughs to be treated, and prevent development of more serious illness. The use of mixtures also reduces the value of individual species and reduces the harvesting pressure on a specific plant population.

The southern plateau has a dry desert environment with abundant pockets of the endemic *airampu* cactus (*Opuntia* sp.) whose seed is traded for its anti-viral properties, while the more humid central region produces an abundant crop of *ancañoqui* (*Ombrophytum subterraneum*), a parasitic plant endemic to the humid central *thola* bush of northern Oruro, also commercialised for its anti-viral properties. Smaller populations of these species found in other regions are not commercialised and only used in local pharmacopeia. *Lampaya* (*Lampaya medica*) is endemic to the southern *puna* and found on the sandy soils in Oruro where the ecology is dry and saline. Communities sell the plant fresh at the annual markets of Huari and Oruro city and it is used for stomach ache, rheumatism, coughs and pneumonia. The south-eastern

cordillera presents a humid environment for high altitude vegetation with wetlands around lakes over 4,000 m.a.s.l. The bitter compounds produced in the pungent *Lampaya* and *Pupusa* (*Poposa* sp.) plants found above 4,000 m.a.s.l in wetlands across the region, are used for serious chest infections. While common across the region, the plants are exploited from the dense patches that grow around the high altitude lakes of the Azanaques mountains in Huari, Oruro. The harvest requires a three day trip along a footpath up into the mountains, which is then sold at the annual market. The bitter compounds in the engorged roots of *altea* (*Nototriche* sp.), *kata* (*Gentianella primuloides*) and *maranzella* (*Werneria* sp.) are found in pockets of the eastern and western cordillera over 4,000 m.a.s.l. and exploited from the Sajama region of western Oruro and some areas in the eastern cordillera. The roots of *altea* sold in the annual *feria* of Huari are peeled, chopped in slices, and dried to a white colour. Slices are dyed black and yellow to create the three colours that form the ‘whole’ in Andean ethnomedicine, and are required to complete the *mesa negra* mixture used in Andean cleansing treatments and rituals. These roots, although present across the entire region, are only exploited commercially from the regions in Oruro where they are abundant. This is due to the low market value of fresh natural flora against the higher value of the mixtures they used for. In this way local pharmacopeia are able to use locally available flora with low costs but not commercialise small plant populations, as the cost of harvest and profit margins are negative or too low.

5.4.1 *K’oa*: regulation of highly endemic species

Resinous bushes, engorged roots and wetland plants contain chemical compounds endemic to the region and specific species are used for severe or ongoing illness. The most abundant and endemic medical compounds of the region are the pungent resins of *thola* and *k’oa* bushes from the central plateau and the high concentrations of bitter compounds produced by vegetative parts of wetland flora, and the engorged roots of creeping herbs found above 4,000 m.a.s.l. The plants are not easily accessed and collection requires a specific trip outside daily activities. The resins and bitter concentrated compounds are used for ‘cleansing’ illness from people, and protection from ‘bad spirits’. The plants are used externally as a bath, wash and insecticide for natural vectors of disease. The resinous bushes of the folk genus *k’oa* are valued for their scent and white smoke when burnt, are sold as part of the *mesa* cleansing mixtures

and offerings. The engorged roots of flora found over 4,000 metres are also valued for their use in the mixture *mesa negra*, used for cleansing illness and as an insecticide. The bitter plants found in high altitude bogs are valued for use in cases of chronic respiratory illness.

The chemical concentrations of engorged roots in *altea* (*Nototriche* sp.), *kata* (*Gentianella primuloides*) and *maranzella* (*Werneria* sp.) are used for diverse illnesses locally, although their primary commercial use is as part of a mixture used for cleansing rituals, and protection from illnesses thought to be caused by mythical creatures and bad spirits. The concentrated and potentially toxic levels of chemicals in plant parts are regulated using processed mixtures and ritualised forms of preparation and application.

The commercial use of non-local endemic plants is also regulated by only using them in mixtures with ritualised forms of preparation. The use of mixtures counteracts basic market principles of supply and demand and can be used to prevent over-exploitation of species. The plants alone have low values in markets, as single ingredients for common illness, and are only considered to be efficacious when used in combination with others, forming the mixtures known as *mesa*. The humid northern high Andes region of La Paz forms an external market region for Oruro. Two important endemic compounds from species whose range are limited to the humid ecosystem of the northern *puna* are the cactus *achuma* (*Echinopsis pachanoi*) and the resinous bush *kille k'oa* (*Loricaria thuyoides*). The two species are commercialised by communities in La Paz where they are abundant and sold wholesale at the annual market of Huari in Oruro. Both species form part of the traditional pharmacopeia of the Andes, although they are only used in *mesa negra* and *mesa blanca* mixture for cleansing illness, prevention of illness and offerings in Oruro, that are prepared by specialist traders in Oruro's central marketplaces. In La Paz, where the plants are abundant, large quantities are used in the *mesa* mixtures and the plants are sold individually for illness.

The *thola* bushes have a distinct pungent aroma due to high resinous content, and present one of the most important vegetation forms across the plateau for its medicinal and cultural value. The word *thola* in Aymara and Quechua means 'firewood' and is used to describe principally species of *Baccharis* and *Parastrephia* (García and Beck 2006: 61) and also includes the folk genus *k'oa*. *Thola* refers to the specific

characteristic of low scrub bushes and use of the wood. The term *thola* is also used as a folk specific for local botanic species found around villages and as part of binomials for folk specifics in other folk genera (e.g. folk genus *k'oa*: folk specific *thola k'oa*). The *tholar* (Quechua: stand of resinous bushes *thola*) form an important habitat for many low herbaceous species, and the root system provides a habitat for the parasitic root tuber *Ombrophytum subterraneum* (*Anquanoque*). *Anquanoque* is cultivated in the *thola* of north east of Oruro where the more humid sandy soil favours production. The *Anquanoque* is cultivated as a local delicacy food. It is also an important medicine used for viral infections, notably those with puss filled spots (Moron 2005), and is available in the marketplaces of Oruro, fresh when in season and dry throughout the year. Folk species of *thola* bush have different local names and denominations in accordance with species present in each region, their characteristic features and uses. The bushes are used for common illnesses such as stomach ache and respiratory illness, although *k'oa* species are preferred for use in cleansing rituals, as offerings and as insecticides. *Muña thola* species are preferred for stomach ache, colic and as condiments, and the *thola* species for firewood. *Parastrephia lepidophylla* has the widest range and is present in humid to semi-desert and the variation of soil types of the *puna* region. The *thola*, *Parastrephia quadrangularis*, *Baccharis tola* and *Fabianna densa* show preference for hills and slopes and are common remedies for stomach ache and minor respiratory illness and are found in local marketplaces across Oruro (García and Beck 2006). Common and locally available *thola* and *k'oa* species are used locally for stomach ache and respiratory illness taken as an infusion, and are used as an antiviral and insecticide against vectors of disease by burning in houses. In the marketplace, the regional and endemic *k'oa* species are sold as part of mixtures used for curing of illness, prevention of illness and as offerings.

The *k'oa* species form an important part of Andean people's cultural identity. *k'oa* species are exploited extensively for use in the local pharmacopeia for common illnesses, but it is their commercialisation as ritual offerings from central marketplaces of Oruro city as *mesa* mixtures that form their cultural value. The *mesa* are distributed across Bolivia, Argentina and in Bolivian communities living in America and Europe, notably in Spain, for cleansing rituals and as offerings to *Pachamama* (Quechua: 'mother earth') for good luck, health and the success of agriculture in rural areas. The *k'oa* species are supplied directly to the annual *feria* of Huari in Oruro and Viacha in La

Paz, and the *k'oa mesa* are distributed from Oruro city's central marketplace the Fermin Lopez market. *Wira k'oa* and the *mesa* have become symbolic of Oruro's traditional heritage, culture and identity.

The four folk species of of folk genus *k'oa* - *wira*, *tika*, *kille* and *campo* - are endemic to specific eco-regions of the high Andes. *Wira k'oa* is endemic to the south western cordillera and forms abundant stands in the Chilean Lauca park that are the commercial source of *wira k'oa* used in the mixture *k'oa mesa*. Recent increase in demand, coupled with restrictions on harvesting in the Chilean park, have seen an alternative species brought in from Peru. The dense pockets of *tika k'oa* and *kille k'oa* (*Loricaria species*) are found in the humid northern environment of La Paz. *Campo k'oa* refers to a range of species found across the central plateau which are not considered the true *k'oas* used for ritual offerings and cleansing by specialists healers, but are used in the *campo* (countryside) for the medicinal properties attributed to *k'oa* species for stomach ache and respiratory problems. The use of folk species of *k'oa* show that non-local endemic species are regulated by the use of mixtures. The use of mixtures and substitution of species enables wealth-levelling and prevents producers exploiting markets or markets over-exploiting resources through elevated demand and elevated prices.

5.5 The eastern inter-Andean valleys: regional medicinal plant resource redistribution and counteracting monopolisation by suppliers

The inter-Andean valleys extend eastward from the high Andes, forming the northern and central market regions. The eastern valley regions ecosystem provides an important resource of endemic plant chemical compounds. These are commercialised in local, national and international markets for their medicinal properties, and role in healing rituals and diet. The region has over seven hundred plants that have been recorded as used for healing. The pre-*puna* and mid valley areas, between 3,600-2,000 m.a.s.l. each have over three hundred plant species used locally for medicine, and the lower valley has over one hundred species (Girault 1987). Medicinal compounds from the region can be grouped into four categories of product sold in the marketplace: resins, incense and sap with essential oils from lowland trees; bark from hardwood trees; fleshy vegetative parts, and root tubers. The upper and mid-valley areas commercialise locally abundant herbaceous medicinal plants. Subsistence farmers and peasants sell a

diversity of herbaceous medicinal plants to supplement their income in local weekly markets, while merchants from the mid-valley region bulk and sell products from the lowland regions wholesale, at the annual markets held across the Altiplano. The lower central valley Chapare region is the main source of commercial medicinal products from hardwood trees: resins, seeds and wood, which are endemic and exploited where they are locally abundant, common and easily accessed.

The eastern inter-Andean valleys form a highly diverse ecological region below the frost line, where the increase in temperature and humidity enable vegetative parts of the flora to become larger and denser. Plant parts become fleshy with larger leaves, and adaptations include waxy leaf coatings, large engorged roots and tubers, flowers and fleshy fruits. These ecosystems and plants develop into natural forests in the lower valley. Shrub thicket and grassy plains give way to highly dense vegetation, stands of low trees with an understory of herbaceous plants develop from 2,800 m.a.s.l. and tall hardwood forests comprising of trees over 15 metres develop below 1,500 m.a.s.l. with thorn bushes and cactus stands in the dry southern zones. The valley production zones change from the highland agriculture based on potato cultivation and camelid herding to one of maize and cereal crops with cattle in the central valley, and fruit, coffee and coca plantations in the lower tropical valleys. The region produces and commercialises important chemical compounds for the highland medicinal plant markets from plant parts of common and abundant flora. The trees of the humid lower northern region produce an abundance of resins, incense and sap with antibacterial and antifungal properties that protect their bark and plant parts against infection in the humid tropical conditions. Trees in the dry southern region produce protective spikes and an abundance of highly concentrated bitter toxins in seedpods to ward-off herbivores. The seedpods are used extensively in the highlands as medicine for cleansing and purging. The region also produces fleshy herbaceous flora, vines, engorged roots, fruits, epiphytes, palm nuts and cacti in the south that are commercialised for their medicinal properties.

The chemical compounds in the vegetative and green parts of the flora often become less concentrated or toxic compared to species growing at high altitudes. The lower concentrations of chemicals in plants create an abundance of mild compounds that can be taken internally without the need for extensive processing or detoxification. The

seeds and hardwoods produced in the lowlands are used for cleansing, purging and ritual cleansing providing ingredients for the *mesa negra* mixture; and the resins, incense and sap are used for infections and cleansing rituals when burnt. While the individual plant uses were commonly known, traders in Oruro followed strict regulations and combined plants in mixtures to balance properties and prevent secondary effects from toxic compounds of certain species.

5.5.1 Common herbs and commercial flora in the upper central valley

Vandebroek and Thomas (2003) recorded 171 native plants used as medicine in Apillapampa district (2,800 to 3,900 m.a.s.l.) east of Oruro, part of the pre *puna* and upper mid-valley area. The market inventory for the market places of Oruro revealed that 30 of these species were sold in Oruro. The plants were common and easily accessible in the region and were sold at weekly markets in Oruro as part of local farmers' economic strategy. The mid-central valley region has commercial cultivation of chamomile (*Matricaria recutita*) and *boldo* (*Peumus boldus*) used exclusively for medical purposes. Chamomile is distributed as a fresh herb through weekly marketplaces held in Oruro and used for commercial packaged herbal teas. *Boldo* is used for the herbal cures and mixtures commercialised by *naturista*, herbal healers and pharmacies, and the dry leaves are sold wholesale at the annual markets held in Oruro. Peasant farmers of the northern and mid-central valley supply the multiple varieties of maize used in the healing and cleansing rituals known as *mesas*, made and distributed across the Andes from the city of Oruro.

Below 2,800 m.a.s.l. *molle* (*Sinchus molle*) is the climax vegetation, the aerial parts of flora form the main plant part commercialised for their medicinal properties, notably for internal cleansing of urinary tract infections, rheumatism, arthritis and muscular illness and wounds. Flora commercialised from the central valley region form important *medicinas caseras* (home remedies) for common illnesses, and part of the pharmacopeia used across the central Andes available in marketplaces. Plants include *cardo santo* used for respiratory illness; the folk genus *ortiga* (Spanish) or *itapallu* (Quechua) 'stinging nettle' species from the *Urtica* and *Cajaphora* genera used for haemorrhages, dysentery, rheumatism and paralysis, *chinchircoma* (*Mutisia* sp.) used for heart and respiratory illness, and *cola de caballo* (horsetail) (*Equisetum giganteum*) used for

kidney infection. Exotic medicinal plants commercialised from the region were identified for their use as home remedies in Oruro and for common illness not requiring complex or ritual forms of use; for example, *melissa*, used for digestion and to alleviate melancholy, *manzanilla* (chamomile), used as a stimulant, for digestion and calming, especially for children, *boraje* (Borage), used principally as a diuretic in cases of pulmonary illness, *sauco* (*Sambucus nigra*) used as a purgative and for cleansing, and *calendula* (*Calendula officinalis*) flowers used as an external compress. The flora are seasonally available in weekly markets and do not constitute a major health threat due to their low toxicity.

Maize forms the principal subsistence crop between 2,000 and 3,000 m.a.s.l., with a multitude of varieties and forms of varying colours and shapes, each with specific uses for cooking specific dishes, nutritional drinks, as well for rituals of healing and for the agricultural cycle. In Oruro, maize varieties are commercialised as part of a complete diet and as a nutritional supplement for children and elderly, playing a role as a medicinal resource. *Api*, a distinctive mauve drink made from corn flour is served hot in marketplaces of Oruro. *Api* is considered characteristic and representative of Oruro city, although the maize grain used for the drink is grown exclusively in the valley of Cochabamba. City residents consider the finest *Api* to be found at Oruro city's central marketplace, 'Mercado Fermin Lopez', and the market is cited in national and international travel guides for its *Api*. The location of Oruro city in the national trade network and its development as a central market for maize has enabled the specialisation and combination of distinct maize varieties. The annual market outside Oruro city provides the only site for the commercialisation of specialised black or mauve varieties of *kuti* maize used in ritual offerings and the distinctive cobs used for luck that are traded and distributed by the traders of Oruro city's central marketplace. The inclusion of maize in the healing ritual mixture *mesa negra* enables cultural regulation and knowledge transmission of the value, beneficial characteristics and indirect health properties of maize. This is described fully in chapter nine.

Fruit tree cultivation in the northern and central zone provides chemical compounds for the pharmacopeia of Oruro market stalls. Figs, *pacay* fruit (*Inga* sp.) and *nogal* nuts (*Julgans* sp.) are grown in the lower valley regions. The fig leaves are used as packing to wrap the fig fruit for transport, and are renowned for their abortive properties, the

black *nogal* wood (*Juglans* sp.) is sold for high blood pressure, and the *pacay* seeds are sold for their purgative properties. Unlike the seasonal supply of fresh fruit to weekly markets, the large orange variety *sidra* (*Citrus medica*) is used exclusively as a medicine for vesicular and bile complaints, and are only brought up from the valley at the annual markets held in Oruro. By drying and preserving sliced fruit, medicinal plant traders in Oruro are able to supply markets throughout the year.

5.5.2 Common floral mixtures, and preventing monopoly by suppliers

The lower valley region supplies a number of important chemical compounds from flora that is abundant and endemic to the region. The three main groups are 1) vegetative flora used in mixtures for internal medicine; 2) the resins, saps and wood products from the humid northern region used in *mesa* mixtures and commercialised for their antiviral properties; and 3) the astringent and toxic concentrations found in seeds of trees from the dry southern region used in the *mesa* mixture and as purgatives. The flora and ethnobotany of the northern *yungas* and Madidi region have been described by Araujo-Murakami et al. (2006). The southern valley is characterised by the Tucuman forest. On the flora of the central and southern valley, see Wood (2005); for a description of the environment and for a checklist of the southern valley Amoro National Park region, see Nee (2004). Currently several species from the region are commercialised internationally as pharmaceutical products and as natural remedies. Vandebroek et al. (2006) recorded over 350 species with local medicinal uses by the Yucarés and Trinitario ethnic group of Chapare province, Cochabamba. The market inventory for my study found 25 of these species forming part of the standard pharmacopeia found in the market stalls of Oruro city.

Referred to as the Madidi – Amoro corridor, the region has a largely intact ecology of natural succession that is considered one of the principal centres of biodiversity in the world (Araujo-Murakami et al. 2006). The region combines deciduous, semi-deciduous and coniferous forest in a series of ecosystems forming strips in the northern humid *yungas* and southern dry Bolivian Tucuman forests. The area remains sparsely populated and has numerous protected areas and national parks. In the last decades of the 19th century and first of the 20th century the region was exploited for medicinal plants for industrial use, notably *quina* used for malaria. Although international demand has now subsided, a regional market in the central Andes still exists for this tree

bark. Since the 1990s, the colonisation and expansion of the agricultural frontier have been important causes of both deforestation and conservation of the humid, semi-humid and dry mountain forest that forms the lower valley region (Araujo-Murakami et al. 2006).

Fleshy herbaceous species are commercialised in the market places of Oruro from the humid mid- and lower valley. Peasants from the provinces of Quime and Inquisivi in the department of La Paz, in the lower elevations of the central valley, sell the endemic flora at the annual *feria* held in Oruro city and in La Paz. The leaves of *matico* (*Piper* sp.) are used locally for colds and flu; *chillca* (*Hedyosmum racemosum*) is used for curing colds, the treatment of venereal disease and to calm menstrual pains; *quimsa cucho* (*Baccharis gentistelloides*), *llave* (*Tripodanthus acutifolius*) and *suelda que suelda* (*Dendrophthora mesembryanthemifolia*) are used for muscle wounds; and roots of the folk species *sazaparilla*, *raiz de la china* and *kalawala* (all unidentified) are used for multiple internal illness and traded in high quantities at annual markets. Plants used locally include *Duguetia spixiana*, for infections, scabies and fungus; *canelón* (*Aniba canelilla*) which reduces fever and is effective against diarrhoea; *sipico* (*Oxandra espintana*) and *chebuque* (*Siparuna* spp.) function as insect repellents. Although they are all used locally, they are not commercialised in the highlands, possibly due to low abundance, difficulty of harvesting, high variation or instability of pharmacological compounds, or lack of knowledge of their use outside the region.

The individual properties and uses of species which are sold are known, but the plants are typically combined to form the basis of mixtures used for multiple internal afflictions affecting the digestion, urinary tract, circulation, menstruation and lungs and physical wounds. These are sold as fresh plant parts at the annual markets in Oruro or dried and sold at daily market stalls in the city. The plants were sold as mixtures in Oruro for: 1) internal medicine for infections, venereal disease, bile, urinary tract, kidney and liver infections and women's problems; 2) as tonics, for rheumatic pains, heart and circulation conditions; and 3) for external use as a compress for muscle or joint injuries and sprains, open wounds, bruises, and broken bones. The plants are both abundant, frequent and distributed across the whole region, which reduces local harvesting costs and enables wholesaling in the highland regions at low prices. The use of mixtures of plants from multiple ecological regions by traders in Oruro enables them

to prevent suppliers gaining a monopoly on products and controlling prices. The trading system is also found in the vegetable markets of Oruro where two products will only be sold as married *casados* and not separately.

The humid northern lowland region is the primary source of plant products with anti-viral and immunological actions found in the resins, sap and wood of hardwood species. The region also supplies varieties of incense and resins used widely across the Andes in the religious practices of different cultures, and compounds of abundant herbaceous flora used for internal medicine. The southern region flora has abundant astringent properties found in tree seedpods. The lower valley region forms a continuous belt of forest stretching from north to south, forming the north, central and south valley system. The northern valley forms the *yungas* ecosystem of La Paz, accessed from La Paz city on the Altiplano. The compressed and steep environment with deep ravines has restricted access to the northern *yungas* of La Paz preventing commercialisation and export of hardwood species. The central valley is accessed from the mountain pass on the Altiplano in Oruro and is formed of the northern humid Chapare *yungas* ecosystem in the departments of southern La Paz, northern Cochabamba and Santa Cruz and the dry southern valley region. Hardwood species with medicinal uses are exploited from the central *yungas* of the Chapare and southern forest where they are abundant and easily accessible. Plant products with anti-viral or immunological stimulants and properties for healing infected wounds and ulcers that are used in Oruro are sourced from resins and substances of a few key species. *Uña de gato* ‘cats claw’ (*Uncaria guianensis* and *U. tomentosa*) and the red sap called *sangre de grado* (blood of grado) from *Croton lechleri* are sold as anti-virals and to heal open wounds and ulcers. *Copaibo* (*Copaifera reticulata*) has been shown to be wound-healing and has anti-inflammatory, anti-rheumatic, antiseptic antibacterial, diuretic, expectorant, hypotension, laxative and purgative properties (Araujo-Murakami et al. 2006).

5.5.3 Regulation of endemic resin and seed supply through use of mixtures

Resins and essential oils obtained from the flora of Madidi (northern *yungas*) and used in pharmaceutical products are: *quina or quinina* (*Cinchona calisaya*), *sangre de grado* (*Croton lechleri*), *copaibo* (*Copaifera reticulata*), *bálsamo or resina* (*Myroxylon balsamum*), *jacojaco* (*Hymenaea courbaril*), *uña de gato* (*Uncaria guianensis*, *U.*

tomentosa) and *alcanfor* (*Tetragastris panamensis*). The resins and incense of *Clusia species* and *copal* (*Protium altsonii*) have a high demand in local, national and international markets. *Copaibo* is used for internal and external medical application and in industrial products. *Uña de gato* has immunological stimulants as well as anti-viral, anti-inflammatory properties and is used to treat leukemia. Recently, *copaibo*, *sangre de grado* and *uña de gato* have been commercialised as ‘natural’ medicine in Bolivia and abroad following the recognition of their pharmaceutical properties. The recent international demand for ‘natural medicine’ and external market for *uña de gato* and *sangre de grado* created an increase in local demand and sales for packaged products. In the *annual market* of Oruro city, the resin of these plants was incorporated into mixtures for internal and external medicine. This demonstrates the adoption of new products into the Andean system of resource regulation using mixtures.

The lower valley supplies the resins and incense used in religious cleansing and offerings sold in Oruro marketplaces. Medicinal plant traders in Oruro sell incense and resins from *Protium altsonii*, *Myrocarpus frondosus* and *Clusia* spp. and balsams from *Myroxylon balsamum* and *Hymenaea courbaril*. These are used for *sahumeríos* (a metal plate with stand and handle, used to burn incense, plants and offerings on hot coals), festivities and religious rituals of different cultures. In the Andean culture and Oruro, the resins are burned in *sahumeríos* for most religious festivals and form part of the “*ch’alla*” ritual used for ‘cleansing’ and bringing luck to houses, offices and market stalls, and to realize payments or *k’oa* for the *Pachamama*. The resin referred to locally as *incense* (*Clusia pachamamae*), is endemic to the montane *yungas* forests of northwestern Bolivia and has only recently been recognized as a distinct and new botanic species by Zenteno et al. (2008). The resin is a clear yellow that has traditionally been collected and marketed by local villagers as the incense *inciense de gloria* used in Andean and Catholic rituals and distinct from the other common incense varieties. Local names of *goma* (*Hymenaea courbaril*), *myrrh* (*Myroxylon balsamum*), local folk specific which is distinct from common myrrh (*Commiphora* sp.) of Asia, *copal* (*Protium altsonii*), which is distinct from the *copal* species of central America, and *incense* folk species, as described above, are each used in specific Andean rituals. The resins are used to keep bad spirits away, although their use for internal and external medicine is also known by traders, who sell them for these uses, in particular incense for stomach ache forming a minor local secondary market. The *incienseiros* (people

who extract incense) harvest from trees using transversal cuts in the bark. The incense trade is well established in Bolivia. Trade in resins from the north eastern *yungas* and valley lowland can be traced back to accounts from the first Franciscan missionaries of Apolobamba (Armentia, 1903) of the Kallawayaya ethnic group of Charazani, located centrally in northern eastern valleys of La Paz, who acted as merchants between the lowland communities of Apolobamba and the capital city of La Paz. In Bolivia the resin has also been used by the Catholic Church as a substitute for Asian resin, when supply from mainland Europe was restricted in the early colonial period. Today merchants from the central valley region continue to trade the incense harvested by the lower valley communities. They sell to the national wholesale distributors who have shops around the Sagarnega road in the city of La Paz, from where they distribute to markets across Bolivia and the Andes.

Chemical compounds with astringent properties and tannins traded in the marketplaces of Oruro are sourced from seeds and nuts from the lower valley zone. These are an important resource of concentrated chemical compounds exploited from the central lower valley region and sold at annual markets. *Willca* (*Anadenanthera colubrina*), *majo* (*Oenocarpus bataua*) and *wayruru* (*Ormosia* spp.) concentrate high levels of tannins and are commercialised for the properties of their seeds used in cleansing mixtures, offerings, and for protection as an amulet of traditional medicine in the Andes. *Majo* (*Oenocarpus bataua*) is a tall palm of 25m that has diverse uses locally for the edible fruit and medicinal roots. It is also the habitat of the worm *tuyutuyu* used locally for medicine and food, and the fruit pulp is used locally to make a refreshing drink, ice cream and produces oils. However, it is the seeds (not reported as a local medicine) that are commercialized across the high Andes for their cleansing and protective properties against illness caused by 'bad' spirits. The seedpods of *negro tajho* (*Proposis kumtaei*), also common in the lowlands, are used in the *mesa negra* mixture of the cleansing rituals prepared and sold in Oruro along with *yanala* (*Bocconia integrifolia*), *kuti waynito* (*Proposis strombulifera*), *wayruru* (*Ormosia* spp.). *Chipi* also called *willca* (*Anadenanthera colubrina*), *quina* (*Myroxylon balsamum*), *negro cabeza* (*Sapindus saponarai*), *chaska margarita* (*Oenocarpus bataua*), *clavera* (unidentified palm species), *churco* (*Guazuma ulmifolia*) seeds and nuts. *Algarrobo* (*Prosopis flexosa*) is also common across the southern lowlands where it is used for animal feed and charcoal; the astringent juice of its seed pods is used as an expectorant

in cases of cough, pulmonary and bronchial illness and is efficacious for dysentery. The seeds from the region are widely used across the high Andes for purging and detoxification, including those of the common leguminous species of folk genus *habilla* (*Canavalia mucuna*, *Canavalia eurycarpa* and *Fevilla cordifolia*) and folk species *chua chua* (*Jatropha curcas*), and *piñon* (*Ricinus comunis*). The concentration of chemicals, their stability, ease of storage and transportation of the dry seeds could explain the extensive use in the highlands, and the limited range of local fresh products made from the fruit with medicinal properties.

Chemical compounds of common hardwood trees, fruit and coffee bean shells also form part of the pharmacopeia found in the medicinal plant markets of Oruro. Wood chips sold in Oruro for cleansing and medicinal properties from the tropical regions include *palo santo*, *quina quina*, *ajo ajo* and *sandalo boliviano*, all common species that are also used in construction. *Quina quina* (*Cinchona calisaya*) is also commercialised internationally and used locally for malaria. In the high Andes, where malaria is not a threat, the bark is used for cleansing and to keep ‘bad spirits’ away. The common hardwood trees *Anadenanthera colobrina* and *Myroxylon balsamum* are both important ingredients in the *mesas* rituals used for cleansing and in offerings prepared in Oruro and used across the Andean region. Locally in the lowlands, the trees are used for their medicinal properties for stomach ache and intestinal parasites. This demonstrates the adaptation of chemical properties to local health needs.

5.5.4 Medicinal resources of the tropical lowlands and external regions

The tropical and sub-tropical zones of the eastern lowland plains form an extension of the ecology and species present in the lower slopes of the eastern valley. The highly abundant, diverse and heterogeneous vegetation combined with sparse population and poor transport has limited the development of the local medicinal plant trade in the lowlands. Highland merchants bring the majority of species commercialised from the region to the marketplaces of Oruro and the highlands. The merchants bulk supplies of common vegetation in lowland towns from local people, thus reducing purchase price and transport costs. Species are secondary products from succession vegetation resulting from other land use. Hardwoods from the central and northern zones are an important export for Bolivia.

The Central Andean environments of the Pacific coast of Chile, the northern Andes of Peru, the southern Andes of Argentina and southern lowlands of Brazil and Paraguay also supply medicinal resources and flora that form part of the Andean pharmacopeia sold in the marketplaces of Oruro. The Pacific coast in Chile provides starfish and seashells used for cleansing mixtures. Chile also supplies *boldo*, *canela* and *cinnamon*, which are grown commercially in the country. Peru provides an extension to supplies of flora from the humid *yungas* region with regional varieties of *uña de gato* and other species that supplement the supply from Bolivia, and a number of mixtures of dried plant parts and tinctures sold as natural medicine. Argentina supplements the supply of some southern flora and supplies of *alucema* flowers (folk specific for Lavender) (*Lavandula angustifolia*), which are grown commercially there. Brazil and Paraguay supplement supplies of resinous and hardwood species and Brazil supplies incense cones made for *palo santo*. Beyond the Andean region, traders in Oruro sell incense products sourced from India and China.

5.6 The implications of classification using medicinal compounds from plants in a chemical landscape

The diversity of ecological regions found in Bolivia creates an uneven distribution of flora and the chemical compounds produced by the plants in these regions. Common adaptation of multiple plant species from different botanic taxa to an environmental constraint creates an abundance of common chemical compounds within certain ecological regions and in plant parts of multiple species. The medicinal plant trade is rarely the primary source of income for suppliers in the region and medicinal compounds are typically a secondary product of common species or vegetation resulting from commercial exploitation of natural resources for wood and agriculture. The use of common and abundant chemical products from plant species from different regions enables a diverse pharmacopeia and reduces the price for the medicinal product. In Bolivia, the lower valley region has a high biodiversity and many people use local plants that form an important part of the local pharmacopeia but are not traded for their medicinal properties. The selection of plant species for inclusion in the pharmacopeia of the Andean marketplace and stalls in Oruro city is dependent not only on a plant's efficacy or properties but also factors of abundance, form of the plant part containing

the chemical, storage, transportability, stability of compounds, and availability of local substitutes.

Plant parts and products sold in Oruro for medicinal purposes are often secondary resources, resulting from other land use practices, which have high concentrations of chemical content in stable, easily storable and transportable forms. Weekly markets enable the circulation of common, fresh and seasonal plant products within market regions and act as centres for bulked material to be brought to neighbouring market regions. The annual markets held in the Andean plateau combine dry and fresh produce and enable plants that are not easily accessible or require a 'special' trip to collect to be commercialised. The selection of raw material and flora to be sold in highland marketplaces from other regions is defined more by the economics of the distribution of chemical compounds and less by the reputation of specific plant species. The emphasis on chemical compounds produced by plant parts or from mixtures of plants sold in marketplaces rather than on individual species, enables substitution between species without dependence on single species or areas of supply forming part of a socio-economic market strategy of Andean medical plant traders. Species, as such, are not exploited, but chemical compounds are sought from regions where they are abundant in the vegetation or in multiple species. Mixtures form an important role in processing of species and creating compounds, where multiple ingredients are substituted according to local floral availability, shifting value from individual plant species to combinations of plant properties.

The dynamic between medicinal plant properties and selection for trade is defined by the distribution of chemical properties across the landscape and within individual species, where chemical concentration, abundance and distribution are the determining factors and not the plant species themselves. These factors form an array of characteristic traits for the distribution of chemical compounds within Andean ecology that result from plant adaptation to different environmental constraints. The variations in chemical compound distribution can be summarised as: 1) chemical compounds in a common species with wide distribution, 2) common chemical compounds with wide distribution across multiple species, 3) localised ecological pockets of chemical compounds or their concentration created by plant adaptation to environmental

conditions, where the same species growing elsewhere may not produce the same compounds, and 4) endemic localised species and chemical compounds. To define the chemical landscape requires combining environmental regions and ecologies where plants produce different chemical compounds, and resource categories based on the form of plant species adaptation or plant parts that produce the chemicals.

Each market region has zones of common herbaceous, woody and specialised endemic species. Chemical compounds are present in concentrations as a result of ecological conditions and plants that concentrate these chemicals in different forms, as resins, seedpods and vegetative parts. Medicinal resources of flora as chemical compounds can be classified into categories of plant products or forms found in marketplaces. In the marketplaces, medicinal compounds are sold as plant parts, which can be divided between categories of: resinous foliage; resins and incense, incense and sap; wood and bark; seeds; roots; fruits; green vegetation and cacti. These form the source categories and environmental regions of resinous bushes found in the highlands (over 3,000 m.a.s.l.), bushes and short trees foliage and small berries found in upper valleys, and high trees over 10m with resins, incense, sap and seeds, wood and bark in the lower valley and lowlands. Vegetative material and herbaceous plant parts are found across all regions. Roots form two groups: highland plants with engorged roots and concentrations of 'anti freeze' with creeping and low foliage, and lowland root tubers that are large and used in mixtures for internal illness. Herbaceous and vegetative plant parts are defined by altitude, with high altitude flora having higher concentrations of properties and lowland flora having more fleshy vegetation. The diverse local herbaceous flora is used for common illnesses. Classification of medicinal compounds into groups of plant parts and regions they come from provides a classification of compounds that crosses multiple botanic species, genera and family and can define regions that supply chemical compounds from the regions that only show the distribution of plant species. The transmission of knowledge about plant uses is not uniform. In most cases traders were aware of local uses, as shown by the case of *quina*, but only sold the plants for a specific use or in mixtures. The transmission of knowledge from specialist traders to the suppliers includes use in a mixture, but forms of preparing mixtures are not easily transmitted, comprising specialist knowledge held by individual traders.

In analysing the chemical landscape across regions and concentrations of compounds in plant parts, the Andean system of exchange seeks abundance and concentrations of compounds to exploit. In this system a low population of local endemic species are not commercially viable if there is not enough chemical compound to be exploited or if other plant species can be used as substitutes in other regions. This is the opposite case to pharmaceutical value where an individual species has an international investment potential for the isolation of compounds. The isolation of compounds in turn has the secondary indirect benefit for local people who are able to validate their knowledge and products through external institutions. While the pharmaceutical recognition of a species' medicinal properties may not directly benefit local people, it can be exploited as a commodity with value linked to an ethnic identity and knowledge. The commercialisation of traditional knowledge using international validation of plants' pharmaceutical properties can create a reputation for other products and secondary benefits from state and international funding to the community or specialist group of origin. While individual plant uses are known, these often form only a part of a compound used for the illness created by using a combination of species and do not necessarily form a medicine in their own right, as ingredients from multiple plant species are needed. The use of specific mixtures and types of plants referred to as 'traditional' or 'local' mixtures by specialised traders in Oruro, form part of a socially defined landscape where both knowledge and products become commodities.

5.7 Summary

The Andean pharmacopeia is formed of common local plant species, endemic flora that requires a special trip to collect, and plants from external regions. Inventories of plants sold at marketplaces in Oruro and their medicinal uses alone do not explain the selection of species for trade, or variations in local uses of plants, or the commercial uses plants are sold for. The research results show that not all plant species are commercialised in marketplaces, and only plants that are abundant in an area are sold outside their local market regions. By focusing on the compounds produced by plants, and not on individual plant species, I have demonstrated the dynamic nature of the Andean pharmacopeia, which includes the important process of substitution of species between market regions. The pharmacopeia can be seen as a product of a particular chemical landscape formed of regions characterised by plant chemistry that is the result

of plant adaptation to the diversity of Andean environmental zones. Compounds that result from plant adaptation to different environments form four distribution patterns; 1) those common in all regions but found in different species; 2) those common in multiple species or in a widely distributed common species in one region; 3) those species that are highly endemic and abundant in one area; and 4) those species that are widely distributed but only abundant and commercially viable in one zone or area.

Medical plant classification is not universal along the market chain, and variations in classification and classification systems exist between harvesters and market stallholders. Stallholders use specialist classifications that enable them to classify botanic plant species and plant parts with the same chemical compounds and identify the variations in the strength of chemicals. Comparing differences in local uses of plants with those plants sold in the marketplace showed non-local plants to be sold predominately in mixtures. Plants traded from external market regions of the lower Andes are abundant and common in the region, are easily transportable and have concentrated chemical properties that can be easily stored. Selling plants from multiple regions in mixtures provides traders with a highly regulated form of exchange that prevents suppliers forming a monopoly by reducing the value of individual plant species and in turn reducing pressure to overexploit endemic plant populations. Highly endemic plant populations are regulated through substitution with other species in different ecological regions and by their sale as part of mixtures as demonstrated by the multiple endemic species grouped within the folk generic *k'oa*. Mixtures of species enable rapid substitution of species and an ability to incorporate new species into the socio-economic system. The mixture is able to cover a broad array of illness that are not well-defined in local terms or by a non-specialist diagnosis. In sum, mixtures serve multiple functions and reflect a socio-economic system used to regulate medicinal plant trade used by specialist market stallholders in Oruro.

Chapter 6

Variation, Cultural Context and Transmission of Medicinal Plant Knowledge

6.1 Introduction: variation and representation of medicinal plant classification

This chapter examines how plant medicinal properties are represented and transmitted along the market chain and how classifications of plant properties can vary depending on the context in which they are interpreted. The pluralistic medical system present in Oruro, the multiple uses of plants and the preparation of mixtures each represent a different context for the classification and interpretation of plant medicinal properties. Andean stallholders share commonly held beliefs related to health, the explanatory model of humoral theory, and the Andean explanatory model of complementary opposites, to justify the selection of remedies, and combinations of plants. The first section of the chapter explores humoral theory and how it is used for the classification of plants and transmission of knowledge about properties of an individual plant and when plants are combined in a mixture. The second section examines how knowledge of the medicinal properties of selected varieties of maize are transmitted between consumers and producers using rituals, guided by cultural values. Together, these two examples provide an understanding of the role of cultural context for the classification and representation of plant properties transmitted along the market chain between specialists and non-specialists, and between producers and consumers.

6.2 Humoral theory and the context of classification in the marketplace

Pluralistic medical systems and specialisation create different forms of knowledge, explanatory models of how plants heal, and the criteria for the selection, classification and boundaries for inclusion and exclusion, or the degree to which plant properties are relevant for different treatments. The humoral theory of opposition is widely used to classify illness and remedies into categories of hot / cold and wet / dry, where illness

from one category is treated with a remedy from the opposite category. Classification of plants into categories of hot and cold based on humoral theory, provide an opportunity to explore variations in how market stallholders' specialist knowledge and selection criteria for plants differ from other groups when used to select plants for illnesses, and to combine plants in mixtures. Furthermore, it can be used to understand how knowledge of the properties of the plants and their curative qualities are represented as categories of hot and cold and transmitted between specialist groups in a pluralistic medical system and along the market chain. The use of humoral classification is common across Central America and the Andean region of South America, but does not extend into the Amazon (Roersch 1994). Hot and cold categories are used to describe, food, drink, medicine and the body's state or types throughout the Andes (Sikkink 2010: 22). The use of hot and cold categories to classify plant properties has been extensively reported in the ethnobotanical literature for Bolivia (see Girault 1987; Bastien 1987b; Bruun and Elverdam 2006; Sikkink 2010).

Medicines are not selected exclusively for their particular active properties, but also “depending on how they fit into people's classification system” (Reyes-Garcia 2010:8). Humoral categories are an important, although not exclusive, part of folk selection criteria. In Mexico, Foster (1988) found variation in the classification of plants and illnesses in the categories of hot and cold. Foster (1988, 1994) concluded that hot and cold categories are used to validate empirical knowledge of remedies rather than being a fixed way to prescribe treatments, and this forms part of a narrative about health where individual cases are modelled around a shared experience. Matthew's (1983) study of hot / cold classification of foods and medicine in Oaxaca (Mexico) found that classification varies depending on context, whereby in one context a given plant can be hot and in another context the same plant might be cold.

Comparing studies in Bolivia of Kallawaya traditional healers (Bastien 1989), Aymaran birth and reproduction practices (Arnold and Yapita 1999) and *naturista* healers (Bruun and Elverdam 2006) shows variation in how categories of hot and cold are used in explanatory models of healing. For the Kallawaya healers of La Paz, Bastien (1989) concluded that the humoral system differed from the Western understanding, being one of balance between the internal body and environment where wet and dry are aspects of hot and cold, and that hot, cold and warm refer to the degree a plant alters the body's

temperature. Arnold and Yapita's (1999) study of the Aymaran vocabulary of birth and the reproductive life of women emphasizes two contexts for humoral categories of temperature, firstly the importance of environmental heat in supporting the process of giving birth, and secondly in the selection of the type and doses of medication. The Aymara humoral classification system *flo* (Aymara: *thaya*) (cold), *caliente* (Aymara: *junt'u*) (hot) and *fresco* (Aymara: *pirisku*) (fresh), is used to classify both the plant and the body of the woman giving birth. The classification of each patient into a humoral category is used to prescribe which plants can be used and which not. Application of medicine is not equal for all women and the classification of the type of body of each patient is used to calculate the doses and application. In birth and reproductive life the Aymara use the humoral system to select and measure doses of medicine in relation to each patient and not simply as a general classification of plants and illness based on their effect in the body. In contrast, Bruun and Elverdam (2006) found *naturista* healers use hot and cold categories as part of their explanatory model to classify illness with multiple causes, while plant properties were described using a biomedical model of pharmaceutical properties. Understanding how traders interpret and use hot and cold categories to classify medical plants, remedies and illness is important for understanding their knowledge, explanatory model and knowledge transmission in the marketplace.

Observation of transactions and interviews with specialist medicinal plant stallholders from Oruro city's two central marketplaces were used to record and discern stallholder's perceptions of hot and cold categories and how they were used to classify and select plants for illness. I found that harvesters, stallholders, specialist healers and non-specialist consumers were all familiar with and used the categories of *cálido* (hot) and *fresco* (fresh, cold) as part of their explanatory model to describe the role of plants, food and drink in the treatment and prevention of illness caused by changes in body temperature. Observations of trading events and interviews in the marketplace revealed a classification of illness and plant remedies into hot, warm and cold categories, and formed part of a more extensive knowledge of plant properties for market stallholders. Hot and cold categories were only used to justify the selection of specific plant remedies for specific illnesses that were considered to be caused by an imbalance of temperature in the body, but not to classify all plants or all illnesses. Categories of hot and cold were not the primary selection criteria for plants in the treatment of illness and

not all hot plants were recommended for cold illness and vice versa. Stallholders listed and agreed with harvesters and *naturistas* on the classification of hot and cold categories for individual plants.

6.2.1 Market stallholders' use of hot and cold categories for selection of remedies and as an explanatory model of illness

Stallholders use specific symptoms to diagnose illnesses, while hot and cold categories are used to describe effects of the illnesses on body temperature, to justify the selection of plants for treatment, and to identify the possible causes of illness. Rheumatism, kidney and bladder infections and colds or minor upper respiratory illnesses were described as characteristic illnesses caused by cold, and diagnosed by their physiological symptoms. The cause for cold illness was described as cold entering the body; examples included damp entering the body from washing with cold water, or getting caught in the rain, loss of heat from an encounter with a cold wind or from consuming cold food. Getting cold was described as a debilitation that could lead to the onset of an illness. It was not perceived to be a direct cause but weakened a person and in turn led to onset of illness if not prevented by using hot herbs or food. Hot illnesses were described as the result of an excess of heat, causes included overexposure to the sun or too much hot food. Hot illnesses included fevers, sun stroke and chronic upper respiratory infections, although these were described and diagnosed using the physiological symptoms and not the cause. One group or sub-category of hot illness referred to the complex of viral illnesses without fever but causing eruptions to the skin with pus, mouth ulcers or inflammation and 'heat' to an infected area. For these hot illnesses, the absence of corporal fever was explained by localised heat of the inflammation or eruption. Eruptions were considered a hot illness and described as excess heat escaping. Eruptions and ulcers are symptoms of viral infections including chickenpox, measles and herpes. Not all viral illness such as mouth ulcers or herpes cause a bodily temperature rise, but they were identified as hot illnesses by their localised symptoms. This indicates that market stallholders in Oruro use a classification system to diagnose illness that relates to biomedical descriptions of viral illness, and classify plants with anti-viral properties within the broad category of hot.

Urinary tract infections and stomach-ache were diagnosed as hot or cold illnesses depending on the cause. One stallholder described how to diagnose illness into hot or cold categories when clients did not know the cause, using the example of the urinary tract infection for women:

‘You can see if you are from *frío* (cold) or *calor* (heat), it is clear in the urine one who knows, will know how. For those illnesses you can see in the sun, in the morning, when you wake up, put the urine in a clean cup, then put it in the sun so the sun can choose. If it is from cold it is cloudy and white like the *chicha* drink, and if it is from heat it is like tea, with no rubbish’.

For urinary tract infection with no clear effect on the body’s temperature, hot and cold categories are used to distinguish between types of infection using diagnosis in a urine sample. The presence of fever would indicate a severe infection in the upper urinary tract that affects the kidney. In the absence of fever, visual analysis of urine is used in biomedical and Andean systems to diagnose illness. The description mirrors biomedical diagnosis of possible minor urinary tract and kidney infection from the presence of cloudy or dark urine. These indicate lower urinary tract infection that may be related to the kidney, or a bacterial infection in the lower urinary tract. In the marketplace the diagnosis of illness using urine is a specialist knowledge used by ‘*One who knows*’ to select the appropriate medicine. Cloudy urine can be an indicator of a cystitis infection, while dark urine is an indicator of poor kidney function. This enables the selection of a specific mixture of properties from different plants for treatment of a specific complex of infections, in the absence of biomedical urine analysis and testing for infection.

Stallholders also used hot and cold categories to classify specific treatments for specific illnesses. Chickenpox and measles are diagnosed from patient’s temperature and eruptions described as the result of an excess of heat. The decoction of *airampu* (*Opuntia soehrensii*) cactus seeds is a renowned treatment for chickenpox and measles in Oruro; it is also prescribed as a mouthwash for mouth ulcers to alleviate symptoms. Stallholders described the plant’s action as taking out the heat, differing from Western humoral theory that seeks to balance internal heat. This is also distinct from the immediate cooling properties of food or a refreshing drink. The effect of *airampu* is not

noticed directly on consumption, forming an empirical knowledge of plants' efficacy with these illnesses. Chickenpox and measles were treated exclusively with *airampu* or *airampu* and other plants, and stallholders would prescribe *airampu* over other plants. *Opuntia soehrensii* has potent antiviral properties effective against herpes simplex, 1 and 2 genital herpes and is non-toxic (Zambrana 2007).

The listing of uses of specific plants for a specific illness by stallholders, in the category of cold plants, supports a theory that hot and cold classifications are used to identify the presence of specific properties related to specific viral infections. The recognition of specific plant properties, in the case of *airampu* antiviral properties, are specific to a complex of illnesses in hot and cold categories, and not all hot illnesses are viral nor all cold plants antiviral. These examples demonstrate a clear knowledge of the relation between diagnosis and classification of infections in relation to specific medicinal properties of plants. For specialist stallholders, hot, cold and warm relate to the presence of specific properties of plants in relation to a specific illness and not only the explanations of hot and cold causes for illness. The category of hot illness represents a complex of different illnesses that are caused by heat, which are identified by their ability to cause a change in body temperature or other physiological indicators, if increased body temperature is not present. The subset of hot illnesses with eruptions is recognised as viral and treated with plants with known antiviral properties. Not all cold plants are used for viral illness with eruptions and cold plants used for viral illness form a subset of cold plant with anti-viral properties; their classification is dependent on the kind of illness they are used for. Further investigation would be required to reveal how other bacterial and immunological illnesses and infections are classified into the categories hot and cold in relation to specific groups of infection.

To understand how plants with hot properties were selected for treatment of an illness caused by cold without eruptions or fever, specialist stallholders were asked how they described the cause and treatment for rheumatism. In Oruro, rheumatism is used to describe a non-specific complex of illnesses that affect the joints making movement painful. Stallholders described rheumatism as an illness of the 'nerves' using the generic description of a severe form causing the contortion of joints that was caused by excess cold. Less advanced forms were diagnosed and described by pain in the joints and restriction in movement. Arthritis was considered a form of rheumatism that only

affected the joints of the hands or feet that was caused by cold, but was not a nervous disorder. There was not a consensus between stallholders on whether rheumatism could be cured. Some stallholders stated you could cure it, while others said it was not possible, and that remedies only alleviated the pain. This may have been influenced by biomedical explanations and courses on natural healing taken by some stallholders. While joint pain can have many causes, biomedical classifications generally assign the three most common diseases to the general terms for rheumatism: rheumatoid arthritis, gout and osteoarthritis. Rheumatoid arthritis is an autoimmune disease that causes the production of antibodies that target and attack other bodily tissue. Gout is caused by the formation of uric acid crystals in joints, the inflammation is caused by the body's defence mechanism which includes sending white blood cells that engulf the uric acid crystals and leads to the release of inflammatory chemicals (cytokines) (Fields 2012), osteoarthritis results in degeneration of the cartilage. Stallholders' descriptions do not clearly identify types of rheumatism that match these three biomedical forms, but suggest rheumatoid arthritis as the main form of 'nervous' rheumatism by the contortion of limbs, while gout and osteoarthritis are classified as a less chronic form of arthritis. Stallholders' described multiple causes of rheumatism from changes in body temperature due to encountering cold air or washing clothes in cold water, which resulted in damp and cold getting into the joints. Rheumatism was considered to be caused by damp and not only cold conditions, and could come from a hot damp tropical or a cold damp location. While the cause was cold and excess damp in the body, specialist stallholders treated it as a cold disease of the 'nerves'. Distinguishing of rheumatism as an illness of the nervous system shows differences in explanations from *naturistas* I spoke with in Oruro and those recorded by Bruun and Elverdam (2006) in La Paz, who described the cause to be cold, damp or food that creating a build-up of toxins in the joints.

Although stallholders differentiated between the illness of arthritis and rheumatism, the causes and treatments for these were the same. Treatment combined plants with analgesic and anti-inflammatory properties along with others that may be specific to each individual biomedical illness. Of particular interest is the selection of plants for rheumatoid arthritis, which require specific properties to deal with the disease. Biomedical treatments for rheumatoid arthritis use immuno-suppressants, which have a side effect of decreasing the body's immune system and in turn the body's response to

other infection and disease (Cannon 2013). Stallholders prescribed treatment for rheumatism as a mixture of hot herbs applied topically, in a bath or wash, followed by hot herbs in a salve to *friccionar*, to rub an area so that it is ‘warmed’ by the friction and plants in the salve. The description of the treatment’s function for rheumatism was to take out the excess cold and damp. This was achieved by the fat enabling the herbs to enter the joints. Both fat and herbs used for the salve were recognised as having individual properties for the treatment and were effective in combination. It is possible that the topical application limits the negative hot effect described for the ingestion of hot plants. This could prevent an immunosuppressant affecting the entire body.

Herbs used for rheumatism were listed as *manzanilla*, *pupusa*, *alta misa*, *romero*, *eucalipto*, *lampaya* and *itapallu*, and were all classified as hot by the specialist stallholders. *Manzanilla* was also listed as neutral for other illness, and one explanation for this could be the presence of properties able to aid illness in the hot and neutral category, but not to have the very hot properties that can be negative to cold illness. *Manzanilla* (Chamomile) is calming and can reduce inflammation, which will ease rheumatic symptoms but not necessarily cure the illness, while other plants may cure the illness but may not soothe the symptoms. Specialists and non-specialists all listed hot plants that should be used for rheumatism, although only specialist stallholders prescribed treatments as a combination of plants in a mixture. It is unclear how the individual plants or combination of plants act on immunological disorders and their associated side effects. Suppression in immunological activity would require boosting the antiviral ability of a patient, and this may be one explanation for the specialist stallholder’s preference for a complex of plant species in treatments. Topical application of hot plants in mixtures may activate properties on a local area and avoid the need to boost lowered defences in the entire body of the patient. When ingested, the combination of plants may reduce toxicity by interaction of the plants, or activate properties of plants not active when used in isolation and merit further investigation.

6.2.2 Market stallholders’ use of hot and cold qualities for classification of plant properties

Interviews with stallholders about the classification of plants into categories of hot or cold ‘temperature’ revealed the use of three categories: *calido* (hot), *fresco* (cold) and

templado (neutral or warm). In this system neutral plants did not alter the temperature of the body and were used in mixtures to reduce the hot property of the hot plants. Specialist stallholders and traditional healers used the classifications of hot and cold to describe specific properties of plants that defined how they could and could not be used, and rules on how plants should be combined for treatments. These findings agree with ethnobotanical works of traditional healers in the Andes for southern Peru (Roersch 1994) and Bolivia (Girault 1987). Within the categories of *calido* and *fresco* specialist stallholders further classified a set of plants as *muy calido* (very hot), or hot plants that could not be used unless they were combined with warm and cold plants.

The most salient hot plants were listed as: *Hoja de higo* (*Ficus carica*), *kalawala* (*Niphidum albopuntatissimum*), *matico* (*Piper elongatum* or *Piper acunifolium*), *sasawi* (*Werneria dactylophyllia*), *lampaya* (*Lampaya castellani*), *ruda blanca* (*Lupinus* sp.), *pupusa* (*Werneria poposa*) *coca* (*Erythroxylum coca*), *eucaliptus* (*Eucalyptus globulus*), *romero* (*Rosmarinus officinalis*) and *itapallu* (folk generic for plant species with ‘stinging’ hairy leaves from the genera *Urtica* and *Cajaphora*). The most efficacious and commonly listed cold plants were *andres waylla* (*Cestrum parqui*), *llanten* (*Plantago major*), *cola de caballo* (*Equisetum giganteum*), *pelo de maiz* (*Zea mays*), *flora blanca* (*Pedersenia cardenasii*), *altea* (*Nototriche azurella*), *diente de león* (*Maytenus ilicifolia* or *Sonchus asper*) and *airampu* (*Opuntia soehrensii*). In the market place plants were identified using visual and olfactory clues and related to hot and cold categories from the identification of folk species. Stallholders did not use taste to classify plants into hot and cold categories. For stallholders the categories of hot and cold were defined by identification of plants and their known effects on illness and the body. Explanations of plants’ hot or cold properties identified properties specific to individual species, and groups of plants for specific illnesses. When describing how hot and cold categories were used to select plant remedies for the treatment of illness, stallholders described how a specific plant or group of plants influenced a specific illness. They did not list plants and illnesses in categories of hot and cold. Both hot and cold categories include exotic plants that have been introduced since the 16th century by the Spanish and more recently introduced species, such as *Eucalyptus*. This shows that the classification is dynamic and based on people’s understanding of plant properties by the incorporation of native and exotic plant material. Hot and cold categories are not a static body of knowledge passed from one generation to the next or one group to

another. Hot and cold categories follow and form a set of regulations that refer to plant properties based on their effect on the body and types of illnesses.

When describing how hot and cold categories related to plant properties, stallholders always described plants in relation to their use as treatments for specific illnesses. One stallholder explained:

‘Stomach ache is cold, *chamomile* is for stomach ache. *Boldo* leaf is for kidneys, *cola de caballo*, *cabello de choclo*, *llanten* as well, these are all cold. You would not use *pupusa*, or *sasawi*, for kidney would you, they are hot, they would make it worse. For *aire* (illness caused by wind) *pupusa* and *sasawi* are good.’

This was a typical description used by stallholders when prescribing treatments that confirmed specific properties of plants related to specific symptoms of an illness and justified these using general humoral theory of hot and cold. Understanding why a particular plant was hot or cold for stallholders was specific to the context of the illness. The explanation shows that hot and cold categories are used to identify plants that have healing properties in relation to groups of illnesses and those which show contraindications and the presence of properties that will be negative in relation to specific illness.

The description of *hoja de higo* (*Ficus carica*), *kalawala* (*Niphidum albopuntatissimum*), *matico* (*Piper elongatum* or *Piper acunifolium*), *sasawi* (*Werneria dactylophyllia*), *lampaya* (*Lampaya castellani*), *ruda blanca* (*Lupinus* sp.), and *pupusa* (*Werneria poposa*) as very hot plants was only reported by stallholders and traditional healers and not by harvesters or non-specialists. Stallholders all stated that the very hot plants should not be given to children, were abortive, were harmful if taken for kidney, bladder, stomach and minor respiratory illness, and caused these illnesses to become worse. Hot plants have bitter qualities that indicate toxicity and bitter has been suggested as a form of classifying hot plants (Sikkink 2010). However, market stallholders did not use bitter properties to describe the hot characteristic of plants and referred to the hot properties as causing mouth ulcers. This reflects how hot plants are recognised as having properties that are toxic to kidney and urinary tract and cause

ulcers. It was considered that hot plants would draw out and cause mouth ulcers if drunk or used internally in excess. This suggests the presence of localised immune suppressant properties that lower defence to viral illness resulting in sores or mouth ulcers. Pharmaceutical chemotherapy used for biomedical treatments of autoimmune disease, rheumatism and cancers use immune suppressants and are known to lower patients' defence against other infections. This would also explain the selection of plants from hot and cold categories to treat minor urinary infections described earlier.

A select group of specialist stallholders knew specific regulations for preparing mixtures that they had learnt from specialist healers or from another specialist stallholder in the form of an apprenticeship. The specialist stallholders who prepared mixtures explained that when using hot plants in mixtures they needed to be softened by mixing with cold and warm plants to balance them or they would make the patient worse. Stallholders considered that minor upper respiratory illnesses or kidney and bladder infections could only be treated with cold and warm plants and that hot plants could not be used unless with cold or neutral plants. This was not commonly known and a point of conflict for the stallholders with *naturistas* and harvesters who sold mixtures at the annual *feria* or in the city. This demonstrates that medicinal plant stallholders hold a body of knowledge about how plant properties are altered when combined.

Stallholders considered the efficacy of their mixtures over the mixtures of *naturistas* and harvesters because of their knowledge of plant properties and regulations they used for mixtures, while other sellers did not 'balance' their mixtures, making them 'incomplete'. *Naturistas* described their mixtures as not having an excess of toxic plants, not that they were balanced by including cold plants. Their description and explanation of toxicity as a basis for inclusion of plants and their quantity in a mixture is based on the plant's individual biomedical properties, not the combined effects of the plants. Harvesters seemed unaware of the negative effects of plants when used individually or in mixtures. Toxicity is a plausible explanation for abortive plants, guidance against use for children and treatment of illnesses of the urinary tract and kidney and was used by *naturistas*. However, it is not clearly shown how toxicity can explain or would affect minor respiratory illness. If these plants did affect immunological responses then this could justify their prohibition for minor respiratory

illness, and the need for neutral plants to counter their effects and change their properties. Certainly the use of hot and cold categories and preference of plant complexes over individual species for treatment demonstrates an empirical knowledge of relationship between combinations of plants and their effect on the illness and the body not held by other groups. The blanket ban on very hot plants as abortive and toxic for children demonstrates knowledge of toxicity and avoidance of possible toxicity rather than the prescription of lower doses for individual species, where toxicity levels vary between individual plant specimens and for different individuals. The use of these otherwise toxic plants in combinations and mixtures for specific illnesses shows how stallholders hold a specialist knowledge of how plant properties are altered when they are combined that was not known by other specialist groups. The stallholder's explanatory model for mixtures differs and conflicts with *naturistas* biomedical explanations, which are justified by the individual plant properties and not combined effects.

When describing properties of plants in the context of illness, stallholders either listed a set of plants, as for the case for the kidney infections given above, or the single plant, as in the example for chickenpox and *airampu*. For specialist stallholders, lists of plants used as treatments for an illness were not only a recital of plants for an illness, as options of possible or alternative species, but a list that was recommended to use as a combination or as a mixture. Stallholders would prescribe a mixture over individual plants. In the case of kidney infection, the list of *boldo* (*Peumus boldus*), *cola de caballo* (*Equisetum* sp.), *cabello de choco* (*Zea mays*) [specifically maize silk; the female inflorescence], *llanten* (*Plantagon major*) were a mixture. These are all recognised by the stallholders to be effective when used individually and these species are also scientifically recognised to cleanse the urinary tract and are recommended for the treatment of kidney infections. The common active property of the plants is for urinary infections. While each plant could be used individually for kidney infections, the use of the plants together was considered to be more effective. This forms a broad complex of plants with properties covering a wider spectrum of variation in the infections, within a viral or bacterial complex with the same symptoms. In the absence of a clear pharmacological classification of the causes of illness, where multiple possible infections have the same symptoms, a complex of multiple plant remedies is a practical solution based in diagnosis of symptoms for a complex of illness. Benefits of

using a combination of plants are two-fold, first they take advantage of a plant's complementary or synergistic properties when used together, and secondly they are able to cover a broader range of illness and infection.

When explaining the importance of selecting the right combinations of plants for treatments and mixtures, specialist stallholders began by stating that the mixture needs to be *completo* (complete), and *completo* is not only the right ingredients but the right combination of ingredients. One stallholder explained:

'It needs to be *completo*, to have the right ingredients. Those who only put some herbs in a mix at the annual *feria*, it is not *completo*, you need to combine as well, you know, *frescos* (cooling) and *cálidos* (hot) as well.

When you combine the plants it depends, if you don't know if it (the illness) is from cold or from hot then we prepare a mixture by combining (plants) from *frescos* and *cálidos*, or if you don't want it to harm the kidney or the lungs then you need to mix only *templados*, it is like this one here (points to prepared mixture), there are *cálidos* and *frescos*, almost *templados* (warm) it does not have *pupusa*, none of those types, these are all *templados*.

Templaditos here (in the mixture) are the *flor blanca*, *diente de leon*, *altía* is *fresco*, *chacataya* is *templado*, it is a little hot, but not too hot, all are *templados*. *Raiz de la china*, *yareta* is a little hot, but ok, *sanu sanu*. There it is, all there, it is a *compuesto* of warm herbs, good for both, good for cold, good for hot. That is how to prepare, while others do not know'.

The description shows that specialist stallholders prepared mixtures specific to illness in the categories of hot, cold and warm or neutral. Selection and combinations of plants did not restrict hot plants to a cold illness or vice versa, and their properties could be altered when used in combinations. The neutral or warm category suggests a category of illnesses that are not specifically related to perceived changes in body temperature. A further phytochemical analysis of mixtures would be required to fully understand

how the different plants act together, to activate or produce effects in the body. Transmission of knowledge about how to combine plants in mixtures cannot be learnt or understood by simply listing individual plant properties and uses, but from experiences of multiple uses of individual plants with multiple illnesses and in different combinations. This makes mixtures a specialist knowledge learnt through repetition of preparations and experience of the types of plants, and not only the list of single plants in hot and cold categories. Such knowledge is not easily accessible in the marketplace from a individual illness experiences, or from purchases and sales with harvesters and non-specialist consumers, and requires extensive explanatory models and comparative analysis of plants' multiple uses, individually and in combination with other plants, to uncover. Stallholders explained that they learnt how to prepare mixtures through family members and forms of mentoring with other stallholders. What is evident is that the marketplace has multiple clients with multiple illnesses and multiple plants, which provide an ideal location for transmission of specialised knowledge of plant uses and properties when used in combination.

6.2.3 The role of hot and cold categories and humoral theory for medicinal plant knowledge transmission in the marketplace

Hot and cold categories form part of a general knowledge of qualities of plants and illness, and specialist knowledge. Different specialist groups have different explanatory models for how hot and cold categories relate to plant qualities. Market stallholders use specialist classifications for plants and hold important knowledge about the selection and classification criteria for plants in treatments. Specialist stallholders use categories of hot and cold to justify and enable specialist and non-specialist stallholders to select and substitute plants for treatments. In the marketplace knowledge of how hot and cold categories are used to classify plants and to select treatments for illness is not evenly distributed between harvesters, stallholders, specialist and non-specialist consumers. Stallholders use hot and cold categories to justify the selection of plant remedies as treatments, enabling them to communicate with non-specialist and specialist clients who have different explanatory models for the humoral system and plant action. For market stallholders, illnesses are caused by the body losing or gaining heat through hot and cold elements in the environment or consumption of food that can weaken a person, cause changes in body temperature, or the accumulation of heat or damp as fluid. Health is

restored using plants to remove excess heat or cold and follow Andean explanations of cause and cure of illness as described for specialist healers (Bastien 1998). Where an illness does not present changes in body temperature that indicate a cause, classification using hot and cold categories relate to specific symptoms of the illness as described for lower urinary tract infections. Stallholders' classification of illness and treatment differ from Western humoral theory and align or fit biomedical explanations of plant properties by understanding hot and cold categories of illness as a complex of biomedical infections and illnesses that responds to specific properties of plants. One complex of cold illnesses respond to treatment for immunological deficiency, and cold plants are prescribed for their properties in relation to the complex of viral illness. Diagnoses for each illness are by specific symptoms that respond to specific properties in the selection of treatments.

Information on plant names, properties of hot and cold, and the illnesses they are used to treat are well known and readily transmitted in the marketplace. This creates a dynamic system able to incorporate new plant material or provide substitutions for unavailable plants. Knowledge of the toxicity of treatments, contraindications and rationale for combinations of plants into mixtures is not transmitted along the market chain to harvesters or between different medical explanatory models in the pluralistic medical system. Stallholders use specialised classification systems to place plants into categories of hot, cold and warm. Hot and cold categories are used to indicate the presence of beneficial and non-beneficial properties of plants related to specific illness. Hot and cold are also used to define presence of chemicals which can be toxic if taken in excess and follow strict rules on how plants can be combined. Specialist knowledge of toxicity and regulations for mixtures based on experience is not transmitted along the market chain or between all stallholders in a marketplace but through apprentice or mentor, forms of one-to-one transmission. The adoption of plants as individual ingredients across medical systems based solely on knowledge of their single form of use and humoral quality without specialist or cultural context can miss inform on how plant properties are altered in mixtures, their toxicity and sub-classification within categories of hot and cold. This may lead to misclassification of pharmacological efficacy. Stallholders hold an important body of specialist knowledge from experience with specialist stallholders and diverse pharmacopeia.

The findings for general or common knowledge and use of hot and cold categories agree with Foster's (1988, 1994) conclusions on the use of humoral system of hot and cold categories. Foster concluded that the inconsistencies in classification mean that the humoral system is used to validate empirical knowledge of remedies rather than being a fixed way to prescribe treatments, and they form part of a narrative about health where individual cases are modelled around shared experience. In the marketplace a shared knowledge of hot and cold category use for healing enables stallholders to justify the selection of plants as remedies with traditional specialists, *naturistas* and non-specialists without using a shared explanatory model. But for specialist stallholders, categories of hot and cold are a specialist classification used to prescribe plants and identify characteristics of their properties. This specialist classification of how plants should be combined and their specific properties is not easily transmitted across different culture's medical explanatory models and systems. The use of classification of the individual properties of the plants for specific illness by *naturistas* differs from specialist stallholders. The use of a set of rules for classification of plants as hot and cold suggests that these are drawn from empirical observation that enable the incorporation of new illnesses or plants into hot and cold categories and substitutions for mixtures. Stallholders have an extensive empirical knowledge that is combined with a specialist classification of specific regulations that enable safe use of plants and their efficacy when used in combinations. Combinations of plants are used for a complex of biomedical illness with different symptoms, as with the case of viral illness, and to treat a diverse complex of biomedical disease with the same symptoms, as with the case of rheumatism.

Stallholders have a specialist knowledge and classification of plant properties which is represented using categories of hot, very hot, cold and neutral to identify specific properties in plants. The categories relate to both the positive and negative effects plant qualities have on illness as individual species or in combination with other plants. Stallholders did not apply degrees of potency within each category but specific uses that confirm efficacy and avoided problems related to measurement of toxicity. For stallholders, hot and cold are a strict set of regulations on forms of use defined by the cultural context in which illnesses are classified. Toxicity or contraindications place plants into strict categories where they can or cannot be used. This latter avoids possible intoxication by incorrect dose and may be a response to variations in toxicity

within individual species and irregularity in treatments by non-specialist users. The clear identification of when plants cannot be used and their properties when used in combination is a body of knowledge which stallholders use to justify their product's efficacy, and distinguishes them from other groups of purveyors. Transmission of these regulations is kept highly stable between stallholders by repetition of rules for plants and mixtures when preparing and trading treatments. The knowledge of criteria for selection and use of categories is stable and uniform due to the form of transmission. It is only after multiple experiences of prescription and treatment with multiple species, illness and mixtures that the common traits can be found and not by simply listing plants and illness into hot and cold categories. The humoral system enables empirical knowledge of plant's uses to cross between different explanatory models, but understanding of the rationale for the more complex classificatory system of plant properties and use in treatments by stallholders requires multiple experiences of plant uses for multiple illnesses, in mixtures and the cultural context of hot and cold categories in relation to illnesses. The market stallholders hold specialist knowledge and play an important role in regulating toxicity of treatments and complex knowledge of substitution of species and preparation of compounds of how plant properties are altered when used in combinations.

6.3 Introduction to Andean maize and ethnomedicinal knowledge transmission

This section explores how knowledge of the medicinal and phytonutritional properties of maize are represented in folk nomenclature, taxonomy, cultural beliefs and rituals, and transmitted along the market chain between consumer and producer.

Anthropological, botanical and pharmacological studies of folk medicine in the Bolivian Andes (see Forbes 1870; La Barre 1951; Cardenas 1989; Girault 1987; Oblitas 1969; De Lucca and Zalles 1992; Gupta 1995; Macías et al. 2005; Sikkink 2010) are either based on botanical and pharmaceutical classification of flora, or anthropologically based, concerned with interpreting the symbolism and meanings of ritual and beliefs for Andean people, with little overlap between the two (see Bastien 2002 for an exception). Understanding medicinal and phytonutritional plant knowledge transmission requires understanding how folk nomenclature, taxonomy, symbolism and beliefs, that record knowledge and experience of plant's chemical properties and their effects on people's health, are used to regulate production of these properties. Exploring knowledge of criteria for the selection, classification and use of maize varieties in Oruro city provides an ideal case to study how knowledge of plant's medicinal properties is encoded and transmitted along the market chain and in the market place to producers. Specifically, the case shows how this knowledge is transmitted between producers using specialist classifications of natural kind, and specialist healers or medicinal plant stallholders and non-specialist consumers using specialist functional classification criteria. Andean maize provides a case to study 1) how knowledge of the selection of crop varieties influence human health is encoded, and 2) how this is transmitted between producers and consumers separated by distance, language, ethnicity, specialisation or social class.

Andean ethno-physiology creates an interrelation within nature and its surroundings, where rituals are used to heal the body and symbolically communicate with the environment, through spatial and spiritual systems (Bastien 1987b: 11-78). The belief of a plant's ability to ward off evil spirits that cause illness have been shown to identify chemical properties of plants that actively deter vectors, which, for example, function as pesticides for the insect which carries the 'chagas' disease in cleansing rituals (Bastien 2002). This highlights how causes of illness are represented as 'spirits' and how plant's symbolic values can relate to chemical properties.

Folk knowledge of cultivated crop varieties has shown traditional beliefs and ritual practices are used to generate and maintain genetic diversity (Johns and Kleen 1986; Salick 1997; Gibson 2009). Selection of characteristics in crops that form named folk categories often constitute intermediate ranking rather than separate taxa and group varieties and subvarieties together based on a criterion of use or ecology. These folk varieties or categories are common in the Andes and represent cultural preference and traditional knowledge of the relationship between selection and use (Brush 2000). Aymara folk taxonomy of potato varieties indicates presence and toxicity levels of chemical properties between varieties (Johns 1986). Perceptual distinctiveness is used to name and select crop varieties and to enable the transfer of knowledge to other farmers and succeeding generations of agronomic benefits and use for food, medicine and cultural, ritual or religious practices (Gibson 2009). The selection of, or the noticing unusual variants, forms the initial step in developing recognisable characteristics and their associated benefits over time (Boster 1985).

Maize (*Zea mays*) is an important crop in Andean agriculture, diet and culture; it is one of the fundamental nutritional sources, used for multiple dishes, hot and cold drinks and in rituals (for examples see: Staller, Tykot and Benz 2005). The diversity of maize varieties, forms and uses present in the Andes are represented in an equally extensive folk nomenclature. In Bolivia, the selection of specific physical forms and colours are reinforced by cultural beliefs, values and ritual. In Oruro, specific forms of maize cob are sought for good luck and kernels for use in a healing ritual known as *mesa negra*. Botanical classification of maize varieties in Bolivia by Avila and Brandolini (1990) (in Avila and Guzman 1998) consider the use of these specific varieties for luck and rituals as superstition, folk beliefs and magic, while anthropological studies have demonstrated how they hold symbolic values for communities when used in agricultural and socio-political rituals (Joralemon & Sharon 1993; Bastien 1998; Fernandez 2010). It is not clear, however, how folk taxonomy of maize is used to transmit knowledge of specific characteristics and benefits to health between consumers and producers, or how it influences varietal selection, crop genetic diversity or planting patterns.

The knowledge of crop characteristics to develop and maintain folk varieties is often restricted to women (Boster 1985; Nazarea 1998; Salick 1997) and shamans (Salick 1997). Salick (1997) found Amuesha women maintain cassava varieties along with

myths, songs, names and indigenous production. Amuesha shamans maintain and breed new cassava varieties, know history, trends, legends and ritual and bring older seeds into modern production as ‘the gift of the ancestors’ (Salick 1997). Cultural practices and beliefs that include ritual and myths are used to represent, store and transmit knowledge of selection for and presence of properties in folk varieties, this provides a model to seek similar systems in the category of ‘wild’ plants in the domain of medicine.

Maize is a staple of the Bolivian diet and the high diversity of maize found in Bolivia is a result of human selection of varieties used as nutritional foods, for agronomic benefits and adaptation to varied environmental conditions. The most popular forms consumed in Oruro are the purple maize used for the *api* drink, *Lagua* soup, the alcoholic drink *chicha* (made from fermented kernels), *choclo* ‘boiled ears’, *humintas* mashed kernels seasoned with anis, salt and sugar around a cheese centre and boiled inside the ear leaf, and *pasankalla* (‘pop corn’). Multiple varieties of maize are used for the dishes of *mote*, ‘dry boiled kernels’, and *tostado* ‘toasted kernels’. The production and consumption of a diverse range of varieties and specific colours of maize forms an important part of Andean diet and culture. The selection of all these maize varieties for their nutritional properties acknowledges wider Andean knowledge, cultural preference and specialisation, with the selection of varieties for their nutritional and health benefits. This corresponds with findings for other Andean crops selected for their combined nutritional and health benefits; examples include selection of potato varieties (Johns, 1986 b), and pseudo cereal crops of *quinua* (*Chenopodium quinoa*) and *cañahua* (*Chenopodium pallidicaule*) that are grown across the southern plateau of Oruro (Bastien 1998).

Andean people have extensive knowledge of plants’ chemical properties and their effects on health. Folk classification is used to identify presence and toxicity of chemical properties in crop varieties, as described in chapter 5. Analogous to the case of maize examined here, the study of potato selection and cultivation by Andean Aymara has shown a sophisticated folk taxonomy that matches scientific classification to varietal level (La Barre 1947; Brush et al. 1981; Johns 1986). Although there are also cross-cutting categories in folk classification that relate to ecology and use (Brush 2000), De Hann et al. (2007) found that the folk taxonomy of Andean potatoes

comprised five ranks: the first of which identified wild, semi- and non- wild classes. They also found that folk specific and variety level taxa have a moderate correlation with genetic make-up characterised by molecular markers. Chemical properties and toxic levels in potato varieties indicated in Andean folk taxonomy and beliefs, which are also used to select and identify characteristics of local cultivars for nutrition and phytonutritional health benefits, and to maintain crop gene pools (Brush 2000; Johns 1996). Social mechanisms and knowledge systems are resilient to external change, and transmission of folk taxonomy and crop diversity has not been adversely affected by market exchange or the cash economy (Brush 1992). A similar finding for maize was encountered in this study.

6.3.1 The cultural importance and medicinal uses of maize in Oruro

Specific maize varieties are used across the Bolivian Andes by Quechua and Aymara communities for agricultural rituals, maize beer offerings (Carter & Mamani 1982) and healing rituals (Bastien 1998; Sikkink 2010; Rosing 1990, 1992, 1993). The botanical and folk classification for these varieties have not been extensively studied or documented. A recent and extensive review of South American maize - 'Histories of maize: multidisciplinary approaches to the prehistory, linguistics, biogeography, domestication and evolution of maize' by Staller, Tykot and Benz (2005) - provides an extensive description of maize varieties, although ritual use is limited to the alcoholic drink *chicha*. Avila and Brandolini (1990) (in Avila and Guzman 1998) provide a reference in the botanical literature to folk nomenclature and classification of varieties, identifying five categories of characteristic they considered pertinent to the selection and evolution of maize varieties:

- 1) Eight rows of kernels on the ear and floury texture.
- 2) Races with high number of rows and small hard grains.
- 3) Maize with large grains that are floury.
- 4) Disposition of seeds with better utilisation of the cob.
- 5) Selection of characteristics for consumption, aesthetics and magic, with special colours, forms and textures⁴.

(Translated by author from citation in Avila and Guzman, 1998: 4-5).

⁴ Specifically races of *checci*, *kulli*, *huilcaparu*, *tuimuru*, *paru*, *chuspillo*, *paca sara*, or *tunicado*, and *cuti sara* or maize with rows of fertile kernels facing in contrary position on the cob, *cuti* is still used for 'magic' purposes.

Following Avila and Brandolini's (1990) folk classification of maize, the folk names *paca sara*, *tunicado* and *cuti* are used to identify folk characteristics of maize landraces (referring to maize which is in early evolutionary stage), where only the *cuti* maize has a magical use. Avila and Guzman's (1998) classification and catalogue of maize races for Bolivia only describes the landrace *paru* (Quechua: golden yellow), which grows in La Paz, as having a *cuti* variety and use for magic. This does not reflect folk taxonomy I recorded and changes the characteristic of *cuti* (also spelt *kuti*) used in the folk classification as a category for botanical maize varieties to a classification of early evolutionary variety.

Maize is produced across the central Andes with cultivated varieties adapted to grow in diverse altitude ranges and ecological conditions. In Bolivia, varieties are cultivated across the country's altitude range, from ecological niches at sea level in the eastern lowland to elevations of 4,000 m.a.s.l. on the warm sheltered slopes of the high Andes. They are also farmed in sheltered pockets on the southern Andean plateau of Oruro. The main production zone for maize in Bolivia is the warm central eastern valley region of Cochabamba, that extends northwards into the provinces of Quime and Inquisivi, in the department of La Paz. Cochabamba has been the centre of intensive maize cultivation since Inca times, when it was established as the production centre supplying the central Andean region. Maize from Cochabamba passed through the Inca storehouses located outside Oruro city, before being distributed across the region and to the Inca elite in the capital of Cuzco, Peru. The work force for this agricultural production was supplied by *mitmaque*, a form of labour draft, or obligation for Inca. Highland communities of Oruro were granted lands in the eastern valley in return for sending work teams to tend and harvest the adjacent fields of the Inca. This created a non-continuous territory for communities centred in the highlands that combined with annual migration and non-monetary exchange known as *trueque*. The annual *trueque* included labour for harvests, exchange of highland produce, principally salt and potatoes, for lowland maize as well as exchange of plants of medicinal and ritual importance. Highland communities were linked to those in the valley through extended kin ties and ritual obligations (Murra 1995).

Today the region continues to be the centre of maize production in Bolivia, combining high input agriculture on irrigated lands with smallholder farmers in outer zones across the central valley. Exchange by annual migration has been replaced by market commerce, although highland communities have retained ties with valley communities through extended kin relations that enable access to lowland resources, albeit through the marketplace (Rist 2002). Only a few families continue the tradition of *trueque* with *llama*, however the annual *feria* markets of Oruro provide ample space for reunions and cultural exchanges. Oruro remains the centre for distribution of maize in Bolivia, although now through marketplace exchange. Maize cultivated across the central eastern valley region is brought up to Oruro city and the *tambo de maiz* (maize market). Oruro's location on the country's major trade arteries provides distribution directly to the national and international markets of Southern America along the pan-Andean highway. As the central marketplace for maize in Bolivia, stallholders in Oruro have the highest quality of maize and can select from both commercial and small holders harvest of produce from across the entire region .

Market stallholders in Oruro select and redistribute maize varieties from across the entire valley region, gaining them and the markets a reputation for reliability of both wholesale stock and the highest quality maize flour products. One product of this selection is the high quality *api*, a highly nutritious drink made from boiled and sweetened maize flour of a specific variety of mauve maize kernels that is served in the city's marketplaces. *Api* is recognised for its nutritious and health-giving properties and recommended for the elderly and young. In 'strengthening' the elderly and young, *api* is perceived to help prevent and fight-off colds, strengthen the physical body and muscles, to prevent sprains, bruising, improve stamina, and generally prevent people from falling ill. These beliefs represent folk knowledge of the medicinal properties of *api* maize varieties in two separate categories - 1) nutrition and 2) biomedical health - both represented as the single folk category of 'strength'. The central marketplace of Oruro city, the 'Fermin Lopez market', is acclaimed internationally for the *api* served there, and is recommended in national and international tourist guides as having the best *api* in Bolivia. One report stated: 'You cannot say you have been to Oruro until you have had *api* at the central Fermin Lopez market'. *Api* is a product of Oruro's role as a trade centre, forming part of the city's identity, representing the commoditisation of the

market stallholder's knowledge and identity as suppliers of the finest quality of products.

In addition to the commercial and central market structure, smallholder producers distribute maize through the annual *feria* (market) held at a town outside Oruro city. The annual maize market on the high plateau enable producers to sell directly to distributors and bypass bulking agents and merchants operating in the central market towns of Cochabamba and the valley region. The *feria* creates an ideal location for the niche market in specialist maize varieties used in agricultural and healing rituals, where specialist producers can sell directly to distributors from Oruro city's central marketplaces. These varieties are not selected from commercial crops and are only available directly from smallholder producers. For the smallholders, the wholesale trade of commercial maize crops is supplemented by the selection and trade of the specific varieties with culturally-defined forms and uses. At the *feria*, wholesale trade in commercial maize kernels and maize flour varieties or the specific varieties used in ritual, was not restricted by gender of producers or stallholders. Until the 1980s the majority of these varieties were sourced through selection from stock arriving in Oruro, or exchanged on the annual *trueque*, when highland communities travelled to the lowland villages to exchange highland produce for valley products.

The distribution of the finest products at the Fermin Lopez marketplace, selected from multiple production regions, extends into the medicinal plant section with the stalls recognised as the centre for *mesa* mixtures used in Andean healing practices. Folk varieties of maize used for rituals have high cultural and economic value with a single cob able to reach up to 100B\$ (ten pounds sterling 10 GBP). The *mesa negra* is one of four categories of *mesas* used in Andean healing. The *mesa negra* sold in Oruro has an average of twenty-five ingredients and are considered incomplete if the twelve varieties of *kuti maiz* kernels are not included. Stallholders display specialist varieties and forms of maize ear on their stalls as advertising for their trade and their status within the marketplace. One of the most prestigious stallholders of Oruro's central marketplace, the Fermin Lopez market, who exports ritual and medicinal preparations across Bolivia and South America, displayed some ten maize ears of the most diverse and sought-after forms, as a symbol of her status and of the traditional authenticity of her products. This enabled her to establish her status within the marketplace.

6.3.2 Folk nomenclature, classification and use of specialist maize varieties

Following previous classifications for maize in Peru and Bolivia, Avila and Guzman (1998) classified and identified forty-five races of Bolivian maize that they grouped into seven race complexes. Each maize race was classified by the size, form, texture and number of rows of the kernels, and race complexes defined by their region of production, features of cob and kernel, or a combination of these characteristics (table 5).

Table 5. Maize race complexes in Bolivia, following Avila and Guzman (1998)

Race Complex	No. races	Race complex characteristic
<i>Alto Andino</i>	4	High Andes
<i>Pisanckalla o reventador</i>	3	Exploding kernel
<i>Racial Harinoso del Valle</i>	25	Floury from the valley
<i>Morocho</i>	5	Specific form of cob
<i>Amazonica</i>	6	From Amazonia region
<i>Perla</i>	5	Kernel and cob shape
<i>Group Cordillera</i>	3	Mountain chain group
<i>Cuban (Introduced variety)</i>	1	Introduced variety from Cuba
<i>Unidentified race</i>	4	

An analysis of folk nomenclature used for maize varieties in Oruro, derived from interviews and discussions with producers, consumers and traders, uncovered folk specifics and varieties. The folk category of maize, *maiz* in Spanish and *sara* in Quechua, is recognised as a unaffiliated folk generic (*sensu* Berlin 1992), equivalent to the botanic species *Zea mays*. Folk specifics for maize corn are identified using colour, shape, texture, distribution and form. These appear to correspond to botanical classifiers for races and most are commonly known. In Oruro, I found several folk varieties recognised for their cultural value: used as symbols of good luck and in rituals. These variety names were composed of lexemes describing morphological characteristics - colour and form of cobs. These were named with bi- or trinomials e.g., *kuti maize negro* or in folk categories, e.g. *mama sara*. This knowledge was only known by smallholder maize farmers, specialist producers, specialist stallholders and Andean healers in Oruro. It was not clear how these varieties fit into a taxonomic structure and present a case of folk categories that are cross-cutting, intermediate or combine varieties and subvarieties.

The ethnobotanical inventory I carried out over two consecutive years, at the *feria* (annual market) held in the town 5km outside Oruro city, recorded folk nomenclature and characteristics for maize varieties sold specifically for ritual healing by smallholder farmers. The *feria* is renowned in Oruro as the most important marketplace for the trade of maize from smallholders in the southern Andean region. Buyers come to the *feria* from across Bolivia to secure stock for the year. These include specialist Andean healers from La Paz and Potosi, and the specialist stallholders from Oruro city's central marketplace, who purchase the highly valued varieties used in healing rituals. Folk specific classification of maize cobs used by smallholder farmers corresponds loosely to botanical races and is used to identify a cob's origin, culinary uses and nutritional properties. Folk variety classes correspond to six specific characteristics and are valued for their cultural importance and use in ritual offerings. Folk nomenclature for maize recorded at the *feria* for maize cob combine folk specific and varieties. The folk nomenclature for varieties or types of *chuspio* (folk specific maize: *chuspio*) of cultural importance were binomials: *chuspio kuti*, *chuspio mama sara*, *chuspio imanta*. *chuspio macho* or *chuspio hembra*, and trinomial or with two specific characteristics: *chuspio kuti macho*, *chuspio kuti hembra* or *chuspio mama sara kuti*. These differ to the classification of races or folk specifics as they are characteristics that are applicable to multiple folk specifics and form a cross-cutting group. The folk nomenclature and features used for the classification of the varieties with cultural and ritual use are distinct from or combined with the names used for folk specifics. This indicates that the dual classification systems of taxonomic races and categories of defined characteristics for maize in Oruro could hold important clues to Andean cultural systems used to maintain crop genetic diversity, agronomic benefits, resistance to disease or pests and particular properties which have secondary or direct health benefits found across maize races.

Nomenclature for the twenty-five folk varieties of maize required for the *mesa negra* healing ritual listed by a specialist healer and market stallholder in Oruro are given in table 6. *Puka ch'ijchi* and *ch'ijchi* represent folk varieties of the race *ch'ijchi*, classified as part of the racial complex 'floury from the valley'. It was unclear, from the limited data I had collected, if these names were local sub-varieties or represented wider known maize races. The specialist classification of varieties were differentiated by colour

taking priority over other properties, black, grey and teak being repeated for multiple varieties. The list highlights the importance of the diversity of colours for the maize used in the *mesa negra* mixture and dark colour or dark as one of two colours, suggesting they may form indicators of other properties.

Table 6. Twenty-five named folk varieties of maize used for healing rituals sold at the annual *feria* of maize. Local names are given as spoken, Spanish when provided, and English translation; taken from interviews with producers recorded by Wilkin.

Local name: As spoken in Quechua / Aymara and Spanish (in parenthesis)	English translation for colour
<i>Amarillo</i>	Yellow
<i>Ch'ijchi</i>	Mottled
<i>Chipchi (Gris)</i>	(Grey)
<i>Chuspillo (Blanco)</i>	(White)
<i>Qorriyapa</i>	Golden
<i>Misa</i>	Two colour
<i>Misa II, Tani tani misa,</i>	Two colour, red white
<i>Oqi</i>	Grey
<i>Oqi II</i>	Grey II
<i>Orqo orqo (Qara Montero)</i>	
<i>Panti</i>	
<i>Perico</i>	
<i>Puka ch'ijchi</i>	Teak <i>mottled</i>
<i>Puka chipchi</i>	Teak grey
<i>Puka moruchi</i>	Teak <i>moruchi</i>
<i>Puka oqi</i>	Teak grey
<i>Puka tani tani</i>	Dominant Red, Red and yellow
<i>Qara yaka (Café)</i>	(Coffee colour)
<i>Tani tani</i>	Red and white / yellow
<i>Wari qunka</i>	(Name used for Lichen)
<i>Yaca, yaqra</i>	
<i>Yana ch'ijchi</i>	Black <i>mottled</i>
<i>Yana ojva</i>	Black <i>Ojva</i>
<i>Yana pauyaraqa</i>	Black <i>pauyaraqa</i>
<i>Yuraj kuti</i>	White <i>kuti</i>

Smallholder farmers from the lower valley select folk varieties to include as a percentage of the seed mix for the following year's crop, the rest is commercialised and traded to highland people for ritual purposes. The varieties used for ritual are highly valued and sought after by highland healers and specialist market stallholders of Oruro

city, who are the distributors for Bolivia and prepare the ritual mixture *mesa negra* they are used in. Increased migration to urban areas and demand for the healing ritual *mesa negra*, combined with the movement to a market exchange system, has increased demand for varieties of maize used for rituals and with cultural value. One smallholder family has specialised in these varieties by selecting and sowing entire fields with them. This demonstrates how the extension of cultural values along the market chain maintains and influences the production of crop selection and diversity. In this case, the transmission of cultural knowledge is equally important as the knowledge of maize variety names and uses, and that the cultural centre for a product is not only its local site of production.

My collection of varieties of maize from the central eastern valley, cultivated by small holder Quechua farmers and sold at the annual *feria* of maize, indicates six characteristics used to classify folk varieties, which were sought for their cultural value in healing ritual and form part of a seed mix used by farmers. These specific features were identified using binary and tertiary nomenclature, and their use described as:

- 1) *Mama sara*: More than one cob in a single ear. Good luck.
- 2) *Suca*: Ears with twelve rows of kernels. Good luck.
- 3) *Imanta* (Quechua: ‘wrapped up’): Kernel semi covered by the pericarp. Good luck.
- 4) *Macho* (male) and *hembra* (female): Folk classification of masculine and feminine characteristics of the cob morphology, size and form related to physical characteristics of men and women (large, round etc.), used in the *mesa negra* mixture.
- 5) *Kuti* (Quechua: ‘to return’): Cobs where the rows of kernels face in opposite directions on the ear, used in the *mesa negra* mixture.
- 6) *Llana* (Quechua ‘black’ or *negro* Spanish): Black maize kernels (actually a dark blue to mauve colour), used in the *mesa negra* mixture.

These folk varieties use two primary classification criteria: colour, used for healing rituals, and form, for good luck. These can be grouped into two sub-classifications:

- 1) those that are unique to folk specifics; and 2) those that can be combined to form sub-categories of varieties and folk specifics. *Llana* (‘black’) can be added to any folk specific and folk variety of maize and increases its value for healing or ritual use.

Examples are *llana mama sara* or *kuti llana mama sara*. *Mama sara*, *kuti*, *suca* and *imanta* were all folk varieties that could be applied in combinations to all folk specifics. The classification of male and female cobs was only used with folk specific and *kuti* folk varieties. *Llana* is an unclear classification criteria for specific or variety classes, and is a characteristic of maize that is recognised for both folk specifics and varieties in maize kernel classification. *Llana* is not used as a strict feature in folk taxonomic classification and is a property found across maize races and varieties related to use and cultural values.

The category *mama sara* (Quechua: mother maize), described by stallholders as ‘many cob in one ear’ or children (see figure 8, 9 and 10 below). *Mama sara* has several subcategories, distinguished by the number of additional cobs in each ear, with folk names for up to five cobs in one ear. Specialist traders referred to the additional cobs as children. Naming corresponded between producers and specialist stallholders from the marketplace at the annual *feria*: *mama sara* (two cob or mother and one child), *mama sara llallagua* (three cob or mother and two children’) (figure 9), *mama sara tijra* (four cob or mother and three children) (figure 10) and *mama sara pirua* (five cob or mother and four children). The higher the number of cobs in the ear, the higher the economic and symbolic value of the ear when used in healing and agricultural rituals. For market stallholders and producers, *mama sara* maize meant good luck, a pair of white and red *mama sara* hung over the door of a house represented good luck, and are a common sight across the Andes.



Figure 8. Maize cob: *Mama sara*, with one ‘child’.



Figure 9. Maize cob: *Mama sara llallagua*, with two ‘children’.



Figure 10. Maize cob: *Mama sara tijra*, with three ‘children’.

Kuti, *imanta* and *llana* maize varieties’ cultural and economic value were increased when they were also *mama sara*. The *mama sara* value was further increased by being *kuti* and *llana* (black). At the annual maize *feria*, a small *llana kuti tejra* (black with kernels facing both directions and three children) measuring no more than 18 cm with only half the kernels attached was the source of fierce and competitive negotiations between medicinal plant stallholders from Oruro city’s central market places. The variety is particularly rare and of high cultural value for ritual use. I only recorded two examples sold at the annual *feria*. Producers kept these varieties out of view of the

public, only showing those who requested these varieties by name. The opposite situation is found in the central Fermin Lopez market of Oruro city where *mama sara* are displayed as markers for status and authenticity on market stalls of traders in traditional medicinal plants. In the highland region and Andean cities, the *mama sara* maize varieties represent authentic traditional knowledge and stallholders' status.

Characteristics of form that represent genetic preference for agronomic features, are: male and female, *imanta* (figure 12 and 13) and *suca* (figure 11) maize; these varieties were considered 'good luck' and are used as indicators for the success of future harvests. *Macho* (male) and *hembra* (female) follow a dualistic classification used in the Andes and coincide with male and female features recorded in other ethnobotanical studies, as described in chapter five for male and female medical plant nomenclature. Male cob and kernel features were pointed and straight, while female cob and kernel were round and plump, and referenced by traders to reflect the fertility of women (figure 16). Male-female folk varietal classification was used for folk classification of folk generic cobs, and folk varieties of *kuti* and *suca*, but not for *mama sara* or *imanta*. The use of folk varieties of male and female were considered to increase the ritual healing value of *kuti* maize used in *mesa negra* cures by producers, but were not a specific characteristic sought out by stallholders. *Suca*, cobs with twelve rows of kernels, is recognised in the different folk specific maize sold at the annual *feria*, but the most sought after by market stallholders or the 'genuine article' were considered to be the *llana*, *blanco* and *amarillo maiz*, (black, white and yellow) folk varieties used for flour and nutrition. *Imanta* cobs were recognised for all folk specifics with no particular folk specific of maize cob being preferred by buyers. The *imanta* reflected good luck and was recognised as a distinct characteristic and folk varietal. Its inclusion in planting mixtures suggests maintenance of genetic diversity within single fields and facilitates the introduction of genetic recombinants into cultivated gene pools. An early evolutionary variety of maize was recognised and named as *Perla del Señor* (Spanish: Literally the Pearl of the Lord) (figure 14), a folk generic of wild maize distinct from cultivated varieties and considered to be good luck. This was not sold by the producer, but was shown to other producers and clients in private as a form of authenticity of his status and the originality of his crop.



Figure 11. *Maiz suca*, cob with 12 rows.



Figure 12. Maize cob: *Imanta*, pod corn (Tunicate maize).



Figure 13. Maize *Imanta*, cobs of different folk specific and botanic maize races.

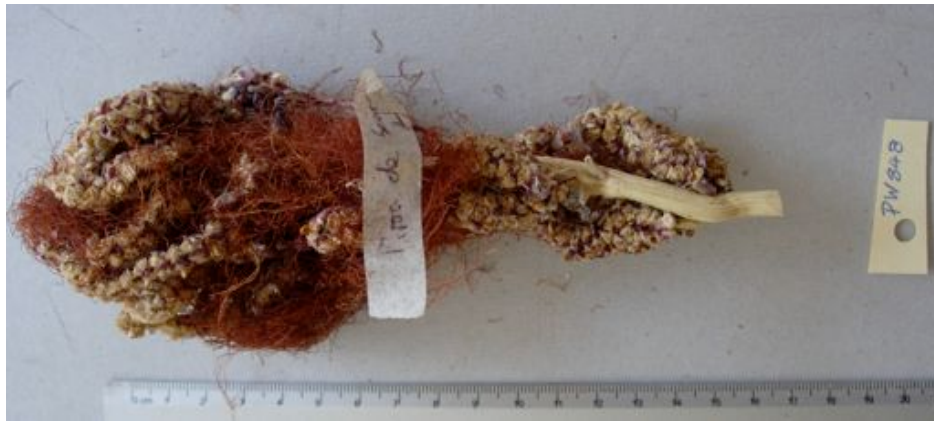


Figure 14. Wild maize. *Perla del Señor*.

The folk varietal *kuti* and *llana* (figure 15 and 16) had specific characteristics, and were sought for their use in Andean healing and for the ritual mixture *mesa negra*. Black maize contains substantial amounts of phenolics and anthocyanins, among other beneficial phytochemicals. The CG3 (or anthocyanin) found in darkly coloured fruits and vegetables, are one of the strongest known antioxidants and black maize varieties have shown a high antioxidant capacity compared with other grain or fruit (Cevallos-Casals and Cisneros-Zevallos 2003). Research has shown that black maize has cell-protecting antioxidants with the ability to inhibit carcinogen-induced tumors in rats (Jones 2005). The high cultural value for black *llana* maize varieties and its importance in the healing ritual *mesa negra* reflect folk knowledge of the recognition of the secondary medicinal value of its consumption.



Figure 15. Detail of *kuti* maize rows of kernels facing in opposite directions.



Figure 16. *Kuti maize negro*, *hembra* (female) above and *macho* (male) below.

The principal producer of *kuti maiz* at the annual market named twenty-five different folk specifics including the term *kuti*, and he considered this to be a complete set of *kuti*. Producers knew names used for folk specific and varietal *kuti* maize in both Spanish and Quechua, and that twenty-four were needed for the ritual mixture known as *mesa negra*. When referring to maize varieties used for *mesa negra*, producers referred to maize names using colour, and not folk specifics used to identify races used for eating. Market stallholders who specialize in ritual mixtures from Oruro city's central market places recognised that the *mesa negra* needed twelve *kuti* maize varieties and could distinguish twelve varieties using their colour. However, the stallholders were unable to name more than six folk varieties. Specialist stallholders sought the six varietal forms listed and the colours of deep red and black for the categories of *kuti*. For the stallholders, the colour, quantity of varieties and specific form demonstrate an alternative non-hierarchical classification based on use. On the other hand, specialists in ritual offerings from Oruro were able to name the twelve varieties of *kuti maiz*.

The ritual mixture *mesa negra* adds a cultural value of diversity and colour with a high number of maize folk specifics, creating cultural representation of genetic diversity in

crops that reflect their benefits in the diet and health. In Oruro, the specific knowledge of the use of maize for health is translated into cultural values, which enable communication between producer's specialist knowledge of maize crops and stallholders specialist knowledge of plant's properties when used in the context of healing. This agrees with Johns' (1986) findings and his chemical ecology model for identifying toxicity within potato crops with effects on health. These data acknowledge that cultural values and ritual preparations or practices, often referred to as superstition or magic in ethnobotany and by the general public, can hold important knowledge of cultivated crops, such as phytochemical, genetic and nutritional properties. The use of plants in ritual forms or descriptions by informants of their use as ritual, or for non-natural illness, cannot be used to define their medicinal properties. Rather these cultural forms of use and value enable knowledge transmission between consumers and producers about characteristics of plant's relation to health, and a body of knowledge of both direct and indirect or secondary medical benefits.

The *mesa negra* requires a minimum of twelve different folk varieties of *kuti maiz*. A single *kuti maiz* ear costs 5-100B\$ (£0.50 to £10). As a rule, kernels are not sold separately or loose in the annual *feria* by producers or retailers. Outside the *feria* kernels are typically sold as a mixture; an individual kernel can sell from 0.5 B\$ to 2.0 B\$ for 5-10 kernels. For clients purchasing a single *mesa negra* it is economical to buy the prepared mixture and not the twelve varieties of individual kernels. The purchase of *kuti maize* directly from producers, and in bulk by stallholders from Oruro city's central markets, enables them to monopolise the sale of *mesa negra*, and has led to Oruro city's central marketplace's reputation for trade in the product and traditional medicine.

The use of twelve varieties of *kuti* in the *mesa negra* appears to have no direct biomedical benefit for the client, based on pharmaceutical properties in a biomedical explanatory model, as the patient does not ingest the maize during the actual ritual. Their representation in the *mesa* reinforces Andean systems of exchange between ecological regions defined by altitude, encourages maintenance of genetic diversity and selection of specific characteristics from specific genes and regulates maize cobs form and varietal characteristics for secondary medicinal and primary nutritional values. Further studies need to address how these classification systems differ across regions and if they can also be used to reflect the origins of maize varieties. Stallholders

recognise the value of dark colours in the maize and value these for mixtures used to maintain health as secondary benefits of consumption of maize that relate directly to chemical properties. The diversity of maize held in these varieties form a record and seed bank, reducing the risk of poor resistance to disease or environmental pressure in fewer varieties. The market system encourages multiple sources of supply and reduces dependence on single sources.

6.3.3 Overview of the relevance of maize to the transmission of knowledge

Folk taxonomy, cultural values of diversity and preference for specific colours and forms of maize varieties in Oruro represent Andean people's knowledge of the effect of plant selection on direct and indirect health benefits. The use of colour to select varieties, such as dark cobs as a characteristic for the *mesa negra*, represents a body of knowledge that relates cultural value and ritual use to the pharmaceutical properties of specific varieties that are distinct from the plant's nutritional benefits. The cultural value of diversity, represented as the number of varieties used in the *mesa negra* mixture, demonstrates how ritual practice and common Andean values are used to maintain genetic diversity within crop varieties. The emphasis on the specific characteristic of colour demonstrates how folk classifications of natural kinds are placed into a context of Andean beliefs to justify plants' therapeutic properties. Traders specialising in ritual preparations use a specialist classification based on use, whereas colour is used to identify maize varieties with specific chemical properties. Maize varieties non-direct medicinal benefits, from varieties selected for 'cultural practices' by specialist stallholders, are a cultural representation of their body of knowledge. This highlights that rituals and cultural practices are not simply folk beliefs, superstitions or magic, as often reported in ethnobotanical, agricultural or botanical literature, but are based on knowledge that links folk classification, morphological indicators to the health outcomes to plant selection. In the case of maize, the cultural practices and preferences are used to maintain diversity and cycle varieties and diversity back into gene pools. They also enable transmission of knowledge between specialist and non-specialists and users and consumers through a common value and language of colours and diversity. The data from the maize presented here shows the importance and need to understand folk categories and nomenclature in the context of the plant use and that medicinal plant knowledge cannot be elicited or measured against lists of plant names and use alone.

Maize forms an important part of Oruro's cultural identity. The city's marketplace stallholders play an important role in relation to the supply of specialised maize varieties used in healing mixtures, which demonstrate their specialist knowledge. My data build on findings in anthropology of the symbolic importance of maize in diet and the use of ritual *mesa* offerings to reinforce exchange (see Bastien 1998), by demonstrating how they represent nutritional and phytonutritional properties and benefits. It is clear that this knowledge is not only symbolic, but representative of, and grounded in, an understanding of the relation between plant selection, nutrition, chemical properties, crop diversity and health. The results agree with Johns' (1996) finding of Andean peoples' recognition of the chemicals benefits of plants to health and selection of crop varieties with secondary medicinal benefits by the selection of bitter potato varieties for health benefits. The results show cultural systems used for the maintenance of genetic diversity for potatoes, through folk selection of varieties with cultural importance and ritual use (Johns 1996; Brush 1991).

The importance of Oruro city's central marketplace as a cultural centre for selection of specialist maize is similar to Bestor's (2004) finding for the Tsukiji fish market in Tokyo, which is a centre for cultural values of selection and production of fish products. The results demonstrate how cultural knowledge, encoded in values for plants, links specialist knowledge and classification structures of use for health to taxonomic classification structures of varieties selected by producers. The model of annual markets in towns on the Andean plateau enables transmission of highland specialist knowledge of characteristics of maize varieties with health benefits to specialised producers in the valley. The stallholders link consumers and producers, who never meet, through cultural values for characteristics of maize common to multiple landraces into selection criteria for future varieties and crop diversity. Knowledge transmission has not been lost with the movement to a cash economy, or to a central marketplace distribution model centred in the city. Rather this has furthered production of traditional varieties and maintenance of gene pools. Cultural values associated with these varieties have not been affected by urbanisation. To the contrary, the marketplace has helped develop specialised knowledge of maize varieties and medicinal benefits. The specialisation in maize has been used as a form of local identity and value for stallholders in Oruro to commoditise traditional knowledge.

The annual market enables stallholders to compare and identify variations between products sourced from different regions and different producers. This enables them to develop specialist knowledge that is unique to their role in the market network. Specialist stallholders in maize for ritual use link specialist knowledge of consumption from consumers to specialist knowledge of producers, using commonly recognised cultural values as indicators for selection of maize varieties. The central marketplace, set outside the production region, has enabled traders to specialise in maize products, and commoditised their knowledge of specific varieties from across the region whilst strengthening cultural values and traditional knowledge transmission. The growth of a niche market for *mesa negra* and the specialised forms of *maize* enables specialist knowledge, held in cultural values of shape and colour, to be channelled back from the highland region to regulate production, crop diversity and the selection of characteristics of maize varieties.

The market system and its stallholders strengthens cultural identity and traditional values, and forms an important centre for the specialist body of knowledge. The knowledge embedded in folk beliefs and ritual use falls outside state and international programmes of agricultural support and remains regulated through communal systems. State programmes to improve nutrition or agronomic benefits from commercial maize varieties may eliminate culturally important characteristics and values, gained over generations, for other benefits. The use of mixtures of specific plant varieties as offerings, known as *mesa* in the Andes, have strict forms of preparation, and are based in cultural systems used by specialist healers and market stallholders that enable transmission of knowledge for plant selection between producers and consumers of different languages and ethnic groups. The use of non-specific classification of benefits to health, such as ‘strengthening’ and ‘good luck’, for complex selection criteria enables these characteristics to be incorporated in multiple medicinal explanatory models and transmitted between specialists and non specialists. The ability to transmit knowledge of plant benefits to health across distances, between producer and consumer as well as between social classes, requires general terms that relate to common explanatory models of health.

Agricultural programmes that do not include multiple selection criteria and cultural mechanisms that recycle crop genes are ignoring generations of experience from Andean farmers. Increased poor health or poor harvest would result in demand for 'lucky' and ritual varieties and forms to pay the spirits for the good luck to return: this in turn would demand more specialised varieties and return genetic diversity back into crops. The common belief in 'bad luck' and ill health represented as 'strength' enables non-specific general knowledge to be recycled back into specialist knowledge of selection for crops. The ritual system, beliefs and use of specific markers of maize qualities are used to maintain gene pool diversity, and to select varieties for their healing properties. The transmission of folk beliefs and cultural values enable this process in conjunction with specialist knowledge of folk nomenclature, taxonomy and use. The use of cultural values as variety markers combined with the recognition of quantity or colour, which are easily identified by non-specialists, is a key component of the medicinal plant knowledge transmission that enables communication across multi cultural groups and specialist classification systems. Cultural values of shape and colour and their relation to health can be transmitted and understood when multiple names for varieties, non specialist knowledge of varieties names or explanations of healing models are not transmitted or widely known. In the knowledge system described for Oruro, common accepted values and beliefs are used to transmit knowledge between producers and consumers. This forms a system where complex knowledge of the plants relation to health, discovered through generations of experience and crop selection, is encoded and transmitted using commonly accepted aspects which link use in rituals with end effects. The example of knowledge transmission in the maize market system of Oruro demonstrates that to understand these systems, they need to be explored in the wider context of how people relate beliefs, rituals and offerings to health.

Botanical and ethnobotanical studies have not fully explored folk taxonomic classification of maize varieties and how these are related to phyto-genetic maize taxonomy, genetic diversity or medicinal properties. This study builds on understanding Andean knowledge of what Johns described as 'the chemical ecology' for selection of potato varieties (Johns 1986 b). For studies of knowledge transmission, the case of maize in the Andes shows that knowledge movement occurs in exchange, whether from annual migration or transactions in a cash economy. Market exchange does not always reduce transmission of traditional knowledge, and the marketplace can reinforce and

transmit ethnobiological knowledge by using cultural representations of scientific knowledge between biocultural regions.

Future studies of traditional knowledge transmission will need to pay particular attention to, and combine, folk nomenclature and taxonomy with the cultural values that are often represented in rituals to provide the cultural context for the transmission of knowledge within and across cultures. Cultural values and beliefs hold important knowledge, and form a practical means to transmit complex specialist knowledge and experience developed over generations, not only within communities but between producers, stallholders, consumers and specialist knowledge holders. Uses of plant medicinal properties need careful analysis as to their relationship to health outside their direct use in the ritual. To understand the development of bodies of knowledge developed over generations of crop harvests requires understanding of cultural values for selection criteria in all use categories. Ethnobotanical and pharmaceutical definitions of the category of medicinal knowledge need to extend beyond simple criteria of the form products are used in, to interpret the value of offerings and ritual as forms of recording and encoding knowledge.

6.4 Summary

The classification systems used for plants by medicinal plant stallholders vary depending on the context in which they are applied. Humoral classification varies depending on the use of a plant for different illnesses and when it is used in a mixture. The combination of plants in a mixture balances negative properties of plants. Humoral classification is used to identify negative or toxic properties of plants. Maize has antioxidant properties that are beneficial to health in prevention of illness when consumed as part of the daily diet. The context of maize use in ritual mixtures used for healing can only be interpreted as medicinal when the plant's use in other aspects of life, in this case diet, are taken into account. In the case of maize these classification systems hold important information about genetic diversity which is not necessarily available to commercial plant breeders. The use of commonly-held explanatory models of a plant's medicinal properties enables stallholders to transmit complex sets of knowledge between specialists and non-specialists, and between producers and consumers who have different plant classification systems and are separated by biocultural regions.

Chapter 7

Transmission and Commoditisation of Traditional Andean Medicine at the Annual *Feria* of Huari

7.1 Introduction: constructing the category of traditional Andean medicine

The social and economic contexts of medicine and trade in the Bolivian Altiplano enable each marketplace to create a distinct socio-cultural identity and category of medicinal plant knowledge. The combination of the type of plants traded, the location of the marketplace and perceptions of health in the wider social system are used to construct the different categories of Andean medicine. The annual market held in the rural town of Huari, located an hour's drive outside Oruro city, has gained the reputation and title as the largest and most important market for Traditional Andean Medicine in the central Andes. This has enabled the market traders to retain autonomy for the regulation of medical plant material sold and the commoditisation of Traditional Andean Medicine products, knowledge and cultural identity.

The annual *feria* of Huari is the only marketplace in Bolivia where traders can source both of the seeds, resins and products from the central and southern lowlands directly from wholesalers, and flora from the southern Andes from the communities who harvest them. This makes the *feria* the only location for the wholesale supply and distribution of the plants and ingredients used for Andean medicinal treatments and the traditional ritual *mesa* mixture, the *mesa negra*. As a traditional wholesale market and distribution centre, the marketplace uses Andean categories and systems of classification for plants, medicine and illness, and social norms of trading to regulate the quality, supply and redistribution of the Andean pharmacopeia. The category of traditional Andean medicine is used by specialist traders in the marketplace to define their identity, and to exploit the niche market for the *mesa* mixtures. This chapter traces the origins of the market's cultural identity, and how the category of Traditional Andean Medicine

influences the form of the market. The chapter goes on to describe the layout, trading and the forms of cultural knowledge transmission for traditional Andean medicine that take place at the *feria*.

7.2 The International medicinal plant market at Huari

The annual *feria* of Huari is recognised as the largest and most important marketplace for the exchange of traditional medicine in the central Andes by Bolivian medicinal plant traders, the municipal authorities of Oruro, national (Alba 1987) and international academics (Sikkink 2010), and by the central and South American arm of the World Health Organization: the Pan American Health Organization (PAHO / OPS). This recognition derives from the *feria*'s history, location, and the use of products sold for Andean offerings and for traditional medicine. Changes in social and economic circumstances have shaped the cultural identity of the *feria* as a temporary place: its products, merchants and the social identity of medicinal plants traded there. The promotion of traditional Andean medicinal plant trade in the *feria* can be traced to changes in the growing recognition and importance of 'local', non-industrial natural remedies in Bolivia and abroad since the mid 1980s, and the recognition of indigenous people's political identity and knowledge both internationally and in Bolivia.

In a local newspaper report (La Patria 2006) the mayor of Huari described the annual *feria* as "The International *Feria* of '*Jampi*'", explaining "*Jampi* means medicine in Quechua and each year people arrive from Argentina, Chile and Peru to acquire enormous quantities of medicinal plants which they take in trucks to their countries, and use as primary material in the elaboration of their medicines". For medicinal plant traders in Oruro, the annual *feria* at Huari is the centre for traditional medicinal plant trade and the place to buy the ingredients for the traditional *mesa* mixture used for offerings and in other forms of Andean healing. This 'traditional' identity of the local medicinal plant market supports a political discourse and rationale used by the municipality of Huari to support claims for funding. However, the dominant traders of the *feria* are not local Quechua but specialists from Oruro city's central marketplace: the Mercado Fermin Lopez, together with merchants from lowland Cochabamba and Aymara communities of the southern plateau. The traders and suppliers from the town of Huari and Condo 1km outside Huari, play a minor role in the *feria*, supplying local

plants and acting as retailers in the *feria*.

The trade in Huari creates multiple contexts for medicinal plants to act as a symbol for the town and the *feria*'s cultural and ethnic identity. The identity created through medicinal plants is localised and rooted in the town's political and social history and interpreted, formed and adapted by the changing social and economic circumstances of Bolivia. Traders of medicinal plants at the *feria* form a 'community', not an ethnic group, social class, or regional identity, but a cultural identity that is defined by their products and beliefs. Tracing the development and role of medicinal plants at the *feria* of Huari over the last century provides an understanding of how cultural identity is constructed using place, ethnicity and history to form the category of traditional Andean medicine. The analysis of how the *feria* functions and its socio-cultural aspects, indicate how knowledge and trade are regulated by Andean market traders and their common cultural beliefs.

7.2.1 The identity of traditional medicine and its traders

Held the second week after Easter, the *feria* of Huari attracts over three hundred traders and producers from across Bolivia, and merchants from Argentina, Chile and Peru (Alba 1987; Sikkink 2010), who exchange large quantities of primary material for 'traditional' medicinal plant products. The location between the northern and southern ecological regions means that Huari is the central market for long distance wholesale exchange in the southern Andes. The key geographic position combined with the presence of Santiago de Huari, patron saint of the town of Huari, syncretised in the Andean deity for health of the southern Andes, differentiates the medicinal plant products and the cultural identity of the annual *feria* of Huari from the other annual *feria* held across the central Andes. In Oruro, the traders would often refer to their plants as efficacious and of the finest quality as they came directly from Huari, where they had been blessed by Santiago de Huari. This is also a reference to their stock as being direct from suppliers, and as a first grade product that is not mixed or of lower quality.

The *mesa* mixture used for traditional Andean healing, as an offering and to 'return' illness, combines the bright coloured seeds and flora from the lowland, with the *k'oa*

highland plants and minerals which are only available directly from suppliers at Huari. The monopoly on the supply of dry products used in *mesas* enables the traders to control their distribution. The distinct identity as ‘traditional’ Andean medicine and the *mesa* is differentiated from the produce of *herbalists* by the form of plants and their uses. The identity of a ‘traditional *feria*’ enables the market traders to retain the geographic layout, organisation and forms of trade that differentiate it from a commercial trade fair, permanent or weekly marketplaces, or high street shops whose location and layout are regulated by municipal authorities. At Huari the medicinal plant sector of the *feria* of Huari is distinct from the rest of the general *feria*, and is related directly to *Tata* Santiago de Huari (*Tata*, Quechua: Granddad, as a spiritual embodiment of the environment), representative of both the environment and a saint’s image in the church. As a physical part of the environment *Tata* Santiago is represented by the hill and foothill of the town of Huari. For Andean people, *Tata* Santiago represents a powerful entity, described as ‘a knife which helps to cut out illness’ and the relationship between their health and the environment which can be balanced by giving offerings to *Tata* Santiago. The Catholic image of *Tata* Santiago is represented as a 1.5 metres high sculpted image of *El Señor Santiago* (Saint James), riding his horse against the moors; it is located in the church of Huari, forming its dual religious identity.

Tata Santiago de Huari is the patron and image of healing in the southern Andes, protecting the medicinal plant traders and value of the medicine at the *feria*. Traders at the current *feria* of Huari visit the church and give thanks to the *Tata* Santiago de Huari, typically attending a service at the church and *pijchando* (chewing coca leaves as a offering) in his presence; thus combining Andean beliefs for well-being within the Catholic service. During the annual market, medicinal plant traders perform a *ch’alla*, a libation of lager or another alcoholic drink, to the *Pachamama* (mother earth) in the name of Santiago de Huari as part of the Andean tradition of communal drinking when meeting communal members or completing large wholesale transactions with clients. The image of Santiago de Huari is able to unite the traders and is the factor which defines the identity of the plant products and *mesa* mixture made from the plants available at Huari under a cultural code as ‘Traditional Andean Medicine’. *Tata* Santiago forms the basis for regulating the trade in medicinal plant redistribution and use for the *mesa*. Traders said that if they do not give thanks, then the wrath of Santiago will affect their trade.

The *feria* at Huari has gained the now-widespread reputation as the international *feria* for traditional medicine over the last half-century, by combining its history, location and the sheer quantity and the form of the material traded. Public interpretations of ‘traditional’ and ‘indigenous’ medicine, and the corresponding status imposed externally by national and international political discourse, has been used by the municipality of Huari when claiming state funding. However, the traders at the *feria* of Huari continue to use local interpretations that link the plants to the environment in a social and economic system that regulates their trade independent of the other products, and of the *feria* in general and the municipality. This is achieved through the combination of the *feria*’s location between northern and southern market circuits and use of Santiago de Huari as a pluralistic symbolic patron of both Catholic and Andean beliefs, and the products as ‘traditional’ medicine characterised by the *mesa*. The traditional *mesa* has enabled the use of Andean forms of exchange and social regulation through values of products having ingredients from multiple ecological regions and forms of diversity as discussed in chapter 5. Further, as the products are being sourced directly from suppliers at Huari and not from intermediaries, this decreases the potential for adultery of material along the market chain.

Huari’s *feria* is referred to as the first of the five consecutive *ferias* which form the itinerant fair of the southern Altiplano. The itinerant *feria* begins at Huari, before moving to the town of Challapata the week after, then the Northern district of Oruro city the week after that, the Southern district of Oruro city the following week, and ending in the town of Vinto outside Oruro city. In the *ferias* of Huari, Challapata and Oruro city, medicinal plant knowledge and cultural identity are transformed to each of the locations from the history, the perception of the products sold there, public symbols and practices related to tradition and the dominant traders’ and perceptions of the social identity of the marketplace.

The notion of an itinerant and rural subsistence market or fair, moving from one town to the next, creates the impression of a less developed economic system based on household economy. This identity is used to contrast the ‘traditional medicine’ of the ‘informal’ rural marketplace, with state-regulated ‘natural medicine’ sold at the trade exhibition EXPOTECO held in Oruro city. What is clear from the evidence presented

here is that medicinal plant exchange in the marketplaces and the *feria* of Huari is distinct and part of a wider economic system that is not dependant on the economics of itinerant trade alone. Furthermore, 'traditional medicine' takes on a distinct identity at each marketplace that is defined by the plants and links to social division in society. The *feria* of Huari has a distinct character and form for medicinal plant trade that is 'traditional' and differentiates it from the other rural and urban fairs or trade in subsistence agricultural goods and luxury products. The identity of traditional medicinal plant knowledge is formed from the location, history and the Andean patron for health of Santiago de Huari, while the character of the traditional medicine is defined by the dominant type of merchant or trader and dry plant product. In the *feria* of Oruro city the combination of fresh plants from the central valley and the character of an urban marketplace create the identity of the *herbalist* an identity that is analysed in chapter 8. The more recent origin of the *feria* in the city and the fact that the plant medicinal properties are not supported by a patron saint, as in Huari, mean they are perceived as natural and traditional, but not ritualised traditional Andean medicines.

7.2.2 Huari economic niches and the social system regulating trade in medicinal plants

The *feria* of Huari is formed of two sectors, the main 'rural' *feria* and the medicinal plant section, each with distinct socio-economic characteristics. The main rural *feria* is formed of four rows of stalls extending 2km from the entrance to the exit of the town along the trunk road that links Oruro in the north to Uyuni in the south (figure 17 below). The central road of the *feria* had white goods, groceries, urban manufactured goods and regional products on stalls run by itinerant market traders and market stallholders from Oruro city and neighbouring towns. Producers or distributors with specialised products and regional produce form sectors within the fair. Notable sectors are dry fruit producers from the south eastern valley of Tarija and Sucre departments who are located at the north of the fair, the dried cereals from the eastern lowlands of Santa Cruz located around the second plaza at the southern end and local Andean grains and livestock including llama products at the far end. Merchants of coca leaf from La Paz were located in the main plaza leading to the medical plant sector. For the fair, pitches are marked-out by the municipal authority using paint on the pavement, who charge for each pitch used. The pitch rate prohibits entrance for an individual wanting to sell household surplus, but provides a niche for local people who are retailers buying

from wholesale merchants and for rural producers to sell directly to the public. For local residents the pitch rent is offset by not having transport costs or needing to rent storage space or accommodation. This forms the basis of the itinerant *feria* which moved from town to town in the form of an encampment and is the economic basis of annual distribution to urban consumers and rural communities. The system reduces economic loss through middle men, reduces potential for adulteration of produce in the market chain, and the marketplace also enables producer and consumer to meet and learn from each other.

The medicinal plant section at the *feria* of Huari forms a separate market zone extending from the main road and running from the town plaza to the town church. The main plaza of the town is located centrally on the trunk road of the *feria* and forms the T-junction between the main road representing the economic movement along the Andean highway, and the road linking the plaza to the town church, representing the historic cultural centre of the town occupied by the medicinal plant section. Unlike the rural economic role of redistribution for regional or national consumers, the medicinal plant section supplies an international demand for produce with buyers coming from the other departments of the country and neighbouring countries. During the *feria* of 2006 wholesale suppliers of Andean flora boasted of clientele from Switzerland.

The medicinal plant sector extends out from two central blocks along four roads, forming a separate section parallel to the main road of the *feria* (figure 18 below) where over 300 traders of products are located. The central paved road leading down from the church of Santiago de Huari to the main Plaza of the town forms the central area. From here the traders and pitches extend over 250 metres to the outer limit of the town along the two transverse roads. Within the traditional medicine sector, stalls are grouped according to the origin of the traders and their role in the market chain. The central road has specialist and wholesale traders from Oruro city and La Paz, while the outer roads have itinerant traders and retailers who include the *kapachaqueras* (itinerant specialists in Andean household medicine) with inventories of fresh and dry plants, and mixtures made up of products sold wholesale at the *feria*. The outer roads have the sacks of fresh plant material harvested from across the southern Andean region by local communities. Within each sector traders are differentiated by the community they are

from or the departments of Bolivia and the hierarchy of merchants is defined by the quantity of produce forming specialist niche markets.

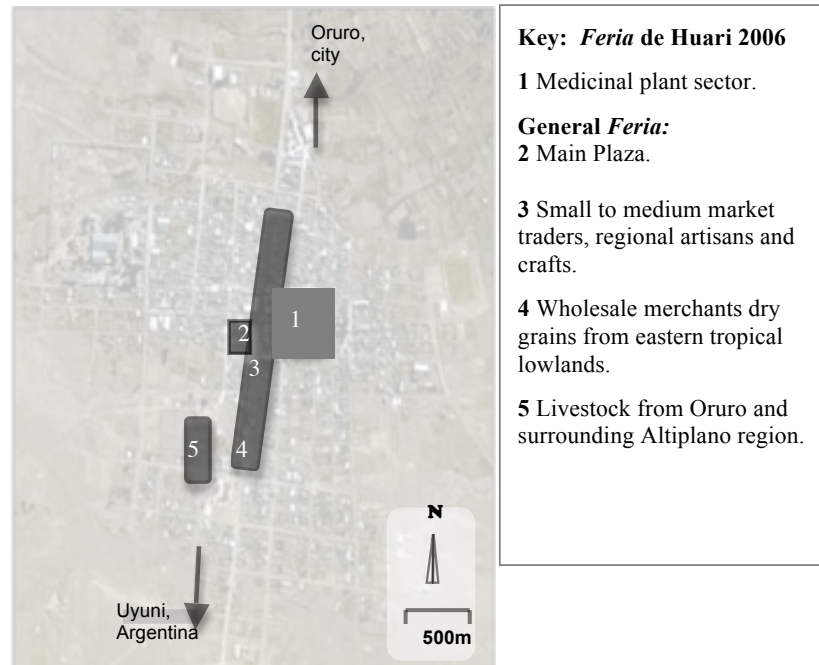


Figure 17. Plan of the annual *feria* of Huari, 2006 (elaborated by Wilkin using Google Earth map).

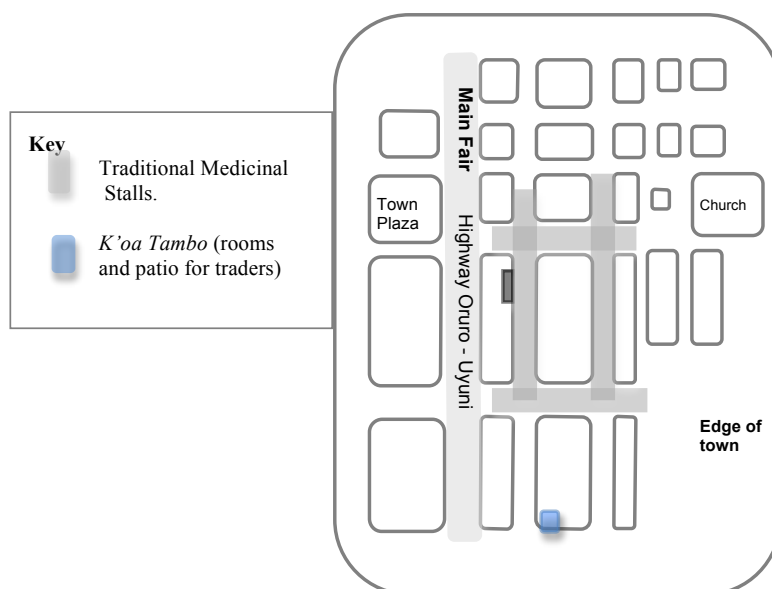


Figure 18. Plan of medicinal section, *feria* de Huari, 2006.

The main road and centre of the medicinal plant sector, between the Church and the town plaza, has the highest traffic in terms of customers, and is the most sought after and prestigious area for medicinal plant traders (figure 19). The central zone had some 20 specialist traders from Oruro city and thirty wholesale merchants from the lower valley. The first block from the church has a notably urban appearance, where *mayoristas*, merchants and the specialist traders of *mesa* and *misterio* (Spanish; literally ‘mysteries’: a flat biscuit, 4 x 4 cm, which feature images of objects and deities, used for *mesa* offerings) offerings from Oruro city’s central marketplace Fermin Lopez have stalls. The traders have extensive stalls that extend over multiple pitches with large stocks of high-value produce on tables with tarpaulin covers, forming temporary stores. This main road has distinct areas or sectors for *mayoristas* (wholesale) traders in Andean products used in the *mesa*, from urban marketplaces, and specialist merchants for dry seeds, resins and the pungent resinous *k’oa* bush, endemic to the plateau, together with minerals that are used in *mesa* offerings, and the *mesa negra* cure used to return illness, each with a monopoly on product distribution and which occupy a market niche.

The urban *mayorista* merchants are distinguishable by their dress, stalls, mannerisms and produce. Their stalls have sacks, or wooden boxes, set to one side. The trader often stands or sits on a wooden stool behind a table or bench. On the table are samples of their wares and their trademark tools, a large tin scoop and pan scales with a sliding weight for measuring weight in pounds. The stalls are set apart from others at the *feria* by taking the form of an urban shop. Merchants wear an apron, flat cap or baseball cap for men, and a sun hat for women. Women wear trousers, and have their hair cut short, without the long plait of the *chola*, to distinguish themselves as established wholesale distributors or from the central marketplace and not *campesino* or *chola*. Stalls often have an assistant or employee to move sacks and to pack produce. These traders have established relations with Huari residents that enable them to hire rooms, which their stalls are in front of, used to store their stock during the *feria*. This reduces the threat from theft overnight and exploitation from the municipal agents of Huari who can confiscate stock if it is not within pitch limits.

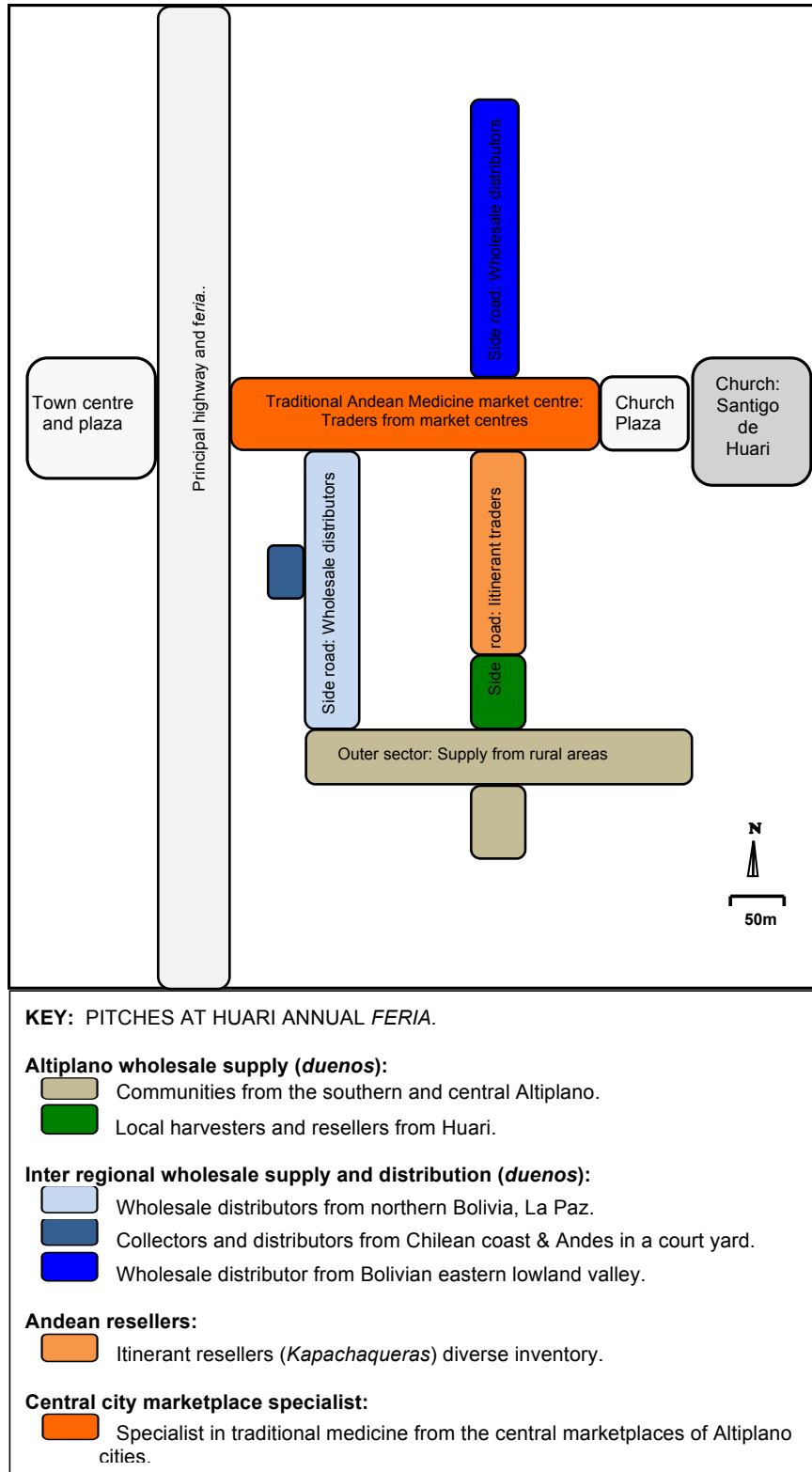


Figure 19. Plan showing positions of traders in the traditional Andean medicine sector of the annual *feria* of Huari, 2006.

The first block on the main road from the church plaza, and the most prestigious position in the sector, had three *mayorista* merchant families from Oruro city's Fermin Lopez market. Their characteristic large stalls are dominated by urban products set out in boxes filled with *misterios*, *alfeñique* (sweets for offerings), which they manufacture themselves; along with *siwarios* (blue powder balls) and resins or incenses sourced from merchants in La Paz. This group of wholesale suppliers define themselves against the rural *kapachaquera* and new traders in the central marketplaces of Oruro, who are retailers of *mesa* by the social network and economic investment that their stock of *misterio*, resins and products used for *mesas* represent.

The transverse road had the wholesale *mayorista* merchants with colourful dry seeds, roots and dry leaves of *boldo* from the south-eastern lowlands of Bolivia: the Chapare, Santa Cruz and Chaco regions beyond the Quechua and Aymara migrant frontier of the Cochabamba valley. The seeds and roots are the basis for the Andean *mesa* and only available wholesale once a year in Huari. The sector also had the notable wholesale supply of *chuichi*, the small packets and lead figures from La Paz, used in the mixtures of plants. The merchants stock was presented on tables with a pan scale and balance to sell to retailers and Roman scale for the wholesale of sacks. The clothing was of the urban merchant and the first class urban *chola*, with gold earrings and clothing. Huari is also the centre for the wholesale trade in *k'oa* used in the Andean *mesa* and offerings. *Mayoristas* from the western Andes of Oruro supply the *k'oa* to Huari. The merchants also have mineral clays of *tahjo* and *matajho* from Chile and products from the Pacific coast such as starfish, sea shells and sea bird guano (referred to as *wanu de pájaro* by traders). The wholesale trader stalls and stock are set out around the patio of a *tambo* they hire out, with a central patio surrounded by rooms where they sleep and store their stock, the *tambo*.

In the outer section, and in the roads leading from the centre, over one hundred *kapachaquera* itinerant traders, retailers and petty traders from Huari, the neighbouring town of Condo and Oruro city's Junin street market, set up stalls. These retailers had extensive inventories from twenty to over a hundred individual products sourced at Huari or from multiple *feria* and extensive family networks in other markets, and they also prepared *mesa* mixtures. The traders sat on small stalls or the ground with their wares laid out in bags and sacks. The *kapachaqueras*' inventory of plants, mineral and

animal parts are used to make the *mesa* mixtures. Their products combine with those from the *feria* at Huari and other regional fairs but they do not have wholesale quantities.

The outer road is unpaved and forms the boundary and point of crossing from the surrounding fields and landscape into the marketplace and city. Here over a hundred wholesale suppliers, collectors and harvesters from the villages surrounding Huari sell plants collected from the surrounding countryside of the Altiplano and eastern Andes. Plants are stacked in sacks delivered daily by trucks, and include stones and minerals mined from the south western Altiplano region of Azanaques-Quillacas by communities from Huari and neighbouring town of Condo. The clothes are typical of peasants and represent ethnicity and communities of origin. The pitches have no tables and plants are presented in small piles of single species on a cloth or piece of plastic as samples of the piles of sacks behind the sellers. Each group has four to five plant species that are local.

7.3 Transmission of traditional Andean medicinal knowledge at Huari

Since Huari is the centre for redistribution of ingredients used in the traditional Andean medicine mixture the *mesa*, it is also an important centre for the exchange of knowledge about these ingredients and medicines made from them. ‘Traditional’, ‘natural’ or ‘alternative’ medicine is socially relevant in Bolivia and deals with social perceptions, ailments and cures that do not fall into biomedical categories (Greenway 1998).

Western-trained practitioners cannot interpret symptoms or explain western medical cures in a context of Andean ethnomedical symbolism (Bastien 1987a: 78). The Andean ethnomedical system incorporates a holistic view of health where physical ailments are the result of the ongoing inter-relation of people with their environment. The body is understood through nature as representing and mirroring the land,³ irrigation systems, and social organisation and *ayllu* (Bastien 1987a: 34).

Understanding how the Andean ethnomedical system relates the environment to health provides a way of interpreting the socio-economic system that regulates medicinal plant trade at Huari.

³ Vital properties reflect and generate similar properties in animals, plants and the land. Rivers and underground streams link it, representative body parts, upper level being the head, etc. (Bastien 1987a: 45-48)

The Andean ethno-physiology creates an interrelation within nature and its surroundings, where rituals are used to heal the body and symbolically communicate with the environment, through spatial and spiritual systems, where the body is understood as a hydraulic system (Bastien 1987a: 11, 78). Cures combine therapeutic and ritual use of elements and encompass a plant's symbolic presence in the individual's environment to create balance. In the Andean cosmovisión male and female complement each other to form a whole, and both female and male plants are required in healing (Pestalozzi 1998: 66). The category of Traditional Andean Medicine is used to treat illness caused by disequilibrium of an individual and his environment described as the loss of vital energy. Market traders use two general categories of treatment, *mesa blanca* and *mesa kuti* or *negra* (for a complete analysis and description of the symbolism and types of *mesa* sold in Oruro see Armstrong, 1989). Andean forms of illness described by traders in the marketplace of Oruro follow the Andean explanatory model of balance described above. From my own studies I found the *mesa blanca* is used for prevention of illness through two spheres or forms of social and economic influence, firstly the redistribution and access to resources within the community, and secondly for socially induced psychological and psychosomatic illness. The *mesa kuti* or *negra* is used to cure illness from the folk category of soul loss, a complex of biomedical illness with debilitating effects. Folk symptoms of illness and the causes that require a treatment using a *mesa* form a complex of multiple biomedical illness with causes that combine both natural and spiritual explanations. The most common spiritual explanations of cause were *aire* (air), *susto* (fright) and mythic creatures and entities in the landscape who rob people of their energy, notably the *Lari Lari*, considered to be a form of winged fox. *Aire* demonstrates an illness complex used to describe both physical and biological illness and can be caused by loss of energy of a cold wind taking the 'soul' and lead to mild or severe illness. The loss of a 'soul' is parallel to a low resistance to illness; in diagnosis traders identified loss of soul if the patient could not recover from the illness or was easily susceptible to illness. The *mesa negra* can be summarised as a cure used for non-specific ongoing or debilitating illness.

The *mesas* combine biological action with metaphoric description of Andean values of the importance of strengthening the individual physically through social systems of reciprocity within the community, providing nutrition, and psychologically by cleansing. Further, the *mesa*'s biological action is extended into Andean symbolism of the individual and their relationship with the environment through balance, 'cleansing' and sanitation by removing or regulating vectors of illness, as described by Bastien (2002) for *chagas* disease, by using active properties of the mixture. The five contexts of use for the *mesa negra* can be summarised as: 1) symbolic and physiological; 2) biomedicine as a pharmaceutical for the patient, symbolised as internal balance; 3) biological as a sanitary or vector control in the environment providing an offering and balance to the *Pachamama* (mother earth); 4) regulation of nutritional and active compounds of plant properties through diet, symbolised through descriptions of a complete meal; and 5) Social redistribution of resources represented by land distribution and in communal organisation. The *mesa* represents a specialist set of cultural knowledge about the relationship of plants, environment and health. It follows that to understand the *mesa*, its function, the selection of ingredients and the Andean ethnomedical knowledge of human environment interaction requires an understanding of Andean life that is not explicit simply from the name and medicinal use of a plant alone. Although the symbolism of ingredients and the social and psychological aspects of *mesa* cures have been extensively described (see Armstrong 1990 or Rösing 1990, 1991, 1992, 1993, and 1995), little attention has been given to biological, ecological and biomedical aspects of the supply and selection of ingredients used for the *mesa*.

The literal translation of *kuti* in Quechua is 'turn' and *mesa* in Spanish is 'table'. The *kuti mesa* was explained by specialist stallholders in Oruro as meaning: 'medicine to return illness', or an offering, 'table of food', to the spirits and a metaphor to return illness. To understand the context of the *kuti mesa* and selection of its ingredients requires understanding Andean interpretations and significance of colour, duality and complementarity that relate to the exchange of energy with the environment. The metaphor of the *mesa*, table or banquet for the spirits is extended into communal meals where colours and combinations represent the environment, regions, ecology, communal exchange and health. The process of telling stories and eating together provide the basis on which to share common values and cultural concepts of complementarities used to justify the selection of ingredients for traditional Andean

medicine and the *mesa*. The *kuti mesa* mixture contains plant, mineral and animal products used to cure illnesses identified as caused by witchcraft, and in cleansing rituals to guard against and rid patients of illness that are described as taking the form of malevolent spirits. The mixture typically has between 20 and 50 ingredients (listed in appendix 3), which include dried plant parts, minerals and animal products.

The *kuti mesa* is considered to be incomplete if the correct combinations of individual ingredients and *macho* and *hembra* pairs are not included. Specialist traders and stallholders relate each ingredient to aspects of Andean culture of colour and duality to justify their inclusion and specific selection criteria, although these criteria are specific to certain ingredients and not universal. Most seeds are considered to require a *macho* and *hembra* variety, minerals are complemented by colour: a black mineral needs to be balanced by a white mineral, while gold needs to be accompanied with silver. In many cases it is hard to tell whether the actual rules have a biological reference or are simply a mnemonic device to recall the list of ingredients. These rules and cultural forms of validating ingredient characteristics form a highly specialised knowledge.

The specific ingredients for each *mesa* vary between different regions, plants are added and taken away in relation to the specific cause of each patient's illness and their symptoms. Many of the seeds used from the lowlands have high levels of toxicity and their use in the *mesa* could be related to cleansing through use as a wash or bath. The use of ingredients in the *mesa negra* and in mixtures prepared by specialists provides a cultural regulation for the use of plants with high concentrations of toxic properties and restricts internal consumption. By analysing the structure and form of interactions between traders it is possible to understand how the forms of traditional medicinal plant knowledge represented in the *mesa* are transmitted at the annual *feria*.

7.3.1 Trading, identity and knowledge transmission at Huari

Trading at the *feria* of Huari requires its own cultural vocabulary. There are no official or external bodies checking the pharmaceutical qualifications of traders, or who enforce tests for quality or check for adulteration of stock. Buyers need to be able to identify specialists, differentiate between different species and check for adulteration, while sellers need to establish their reputation. These systems are integrated into the form of

the *feria*, the vocabulary and ways of trading. During the two years I was able to attend the annual *feria* of Huari I was able to record innumerable transactions and develop friendships with suppliers from across Bolivia that extended from year to year. The communal experience for traders during the week the *feria* is at Huari creates a social experience and basis for learning the medicinal plant trade, the stories and words used to describe variations in products and their meanings. By comparing the different groups of traders it is possible to begin to understand how the different forms of medicinal plant knowledge are integrated into the traditional Andean medicinal marketplace.

The first trading events are carried out before the official Huari *feria* opens to the public. Established families, with stalls and wholesale outlets in Oruro city, arrived in the week leading up to the *feria*. At this time they secured prime pitch locations. These traders work as family units and have established agreements with residents in Huari to rent rooms to sleep in and store stock they bring to sell, and new stock they buy. This provides security for their stock and themselves. During this pre-*feria* week wholesale suppliers arrived from La Paz and the eastern lowlands, and by trading outside the public *feria* they avoided pitch rent costs. This trade is very competitive and enables an individual trader to monopolise a product and have access to the higher quality or grade, although it requires experience and knowledge of the products and terms for trade. A buyer needs to be established in a social network or market to have the economic capital to invest and to have the cultural experience to negotiate and not be sold adulterated or mixed quality goods.

Many traders had established relations with suppliers from previous years, a prearranged meeting place, extended family ties and social obligations of *compadrazgo* all formed a part of this pre *feria* trade. As the stallholders set up their stalls for the *feria* it was a time for reunions of old acquaintances through communal drinking and eating, which extend into the *feria* itself as more suppliers and buyers arrived. Many clients and traders only meet annually at the *feria*. In the market centre each stall was run by a family unit and each group of stalls represented a city marketplaces or region. In the outer sections of the *feria* the pitches were formed of groups of families from a single community. Traders sit and discuss how they have fared over the year, current trends, stock availability and customers' preferences. This is accompanied by

communal drinking, eating and *akullico* (communal chewing of coca leaf) among stallholders and their immediate family, buyers and sellers. These encounters enabled discussions on plant varieties, where harvesters' classification of folk species was linked to retailers' specialist classification of plant properties. Stallholders located along the central road had communal activities with extended family who supply and trade at the *feria*, but did not extend these reunions to other stallholders. This enabled highly stable cultural knowledge transmission through ritualised forms along the market chain between buyer and supplier, yet left space for variation between individual stallholders. Traders and stallholders cited *Tata* Santiago de Huari's blessing for their stock and trade as important to their success. By performing the correct and complete social obligations of Andean tradition for social exchange and their metaphoric meanings they were able to please *Tata* Santiago. So, in trying to please *Tata* Santiago the conditions for cultural transmission are created.

The harvesters from Andean communities arrive midway through the *feria* and by having their encampment on the edge of the *feria* are able to avoid paying rent for a pitch. The Andean communities bring fresh vegetative produce by truck. One family explained that they could invest the extra money in harvesting plants, which required a whole day to travel to collect and were outside daily agricultural and herding areas, because of the high demand in Huari. The sellers worked as family and communal units managing stalls. Older members of the group were typically limited to Quechua or Ayamara language but had good knowledge of plant names and varieties as well as local preparations and uses for plants. Younger family members who had little knowledge of plant names or uses were eager traders and acted as translators for older members with Spanish speaking clients. While some plants can lose medicinal properties when dried in the sun others benefit through a solar detoxification (Johns 1996). At Huari some plant species were dried in the sunlight, several roots were peeled and put to dry in the sun while, with others, only a sample was displayed and stock was kept in sacks. This enabled transmission of knowledge through practice of the norms for processing and storage of plant material.

The *feria* reinforces traditions and customs and creates space for knowledge transmission related to storage and use specific to each species. This however was not explicit for the harvester community, who simply prepared the plant saying 'this is how

it is done'. The constant repetition of plant names and uses to buyers, along with discussions within families, between groups and with buyers demonstrated the importance of the *feria* for creating opportunities for knowledge transmission. The distinct shape, colour or strong odours of each plant enables a system that links sensory and linguistic recognition. The economic incentive and repetition of plant names and forms of use means the *feria* forms an important centre for both vertical and horizontal transmission of traditional knowledge of medicinal plant nomenclature and uses within communities. The *feria* also provides an opportunity for harvesters to socialise, discuss and generate knowledge about the plants in reference to, and in the context of, other social and ecological indicators of agricultural production, ritual use, efficacy and demand comparative to previous years. The communities and local suppliers used Andean nomenclature and classification systems of female and male (as described in chapter five) but had limited access, information and knowledge of plants from other regions, mixtures and how plants were selected and combined for the *mesa*.

The specialist Andean medicinal market traders from central marketplaces in cities of the Altiplano and the *kapachaquera* (specialist itinerant retailers of traditional Andean medicine plants and *mesa* mixtures) have a diversity of fresh and dried products, minerals and prepared *mesa* mixtures sourced from various ecological regions. The combination of interregional experience of plants and knowledge of how to prepare the *mesa* mixture, gained from supplying Andean healers, provides further extensions of Andean classification with *macho*, *hembra*, *completo* and colours to explain the need for multiple species and varieties in mixtures. Their specialist knowledge of multiple names, uses and regional variations between folk species set them apart from the communities who supply the plants. These specialist groups highlighted to clients why other seller's products are poor or good quality, when you needed both female and male plants, and how to identify these characteristics for each plant and plants from different ecological regions.

The central Andean distribution system for traditional medicine requires plant material that is easily transported, has stable consistent volumes of active ingredients, available in high quantities, that does not perish rapidly, is easily identifiable and not easy to adulterate. Seeds and seedpods, resins, dry roots, petals and vegetative parts with high concentrations of essential oils or bitter chemicals retain stability of properties. The

more concentrated a chemical property is in a plant, the less plant material there is, and the easier it is to transport and store. However this also means that plant material has potentially toxic levels.

The *mesa* and *mesa negra* or *kuti mesa* mixture is the basis for Andean traditional healing. The *mesa* can use up to thirty different ingredients, most of which are distributed wholesale from Huari. The plants used in the *mesa negra* are highly regulated by traditional Andean medicine codes for the selection and combination of ingredients and specific forms of preparation and use. The mixture contains potential toxic and hallucinogenic plant seeds. The *mesa* is applied as a wash and bath to cleanse as a topical treatment or through inhalation of the smoke from burning and typically administered by specialists. The preparation of the *mesa* is also a specialist skill performed by specialists in Andean medicine, *kapachaquera*, and the specialist medicinal plant market stallholders of Bolivian cities. Traditional forms of preparation limit the quantity of each ingredient. For the *mesa* the importance of *completo* to be complete, is more important than a quantity of ingredient to enable a cure, creating a further cultural safeguard against toxicity of plants if used in excess.

The concentration of plant properties enables ease for storage and transport. Mixtures, which have no distinguishable plant parts, are open to question of adulteration. The basis of the Traditional Andean Medicine is that plant material should be easily identifiable, has stable properties and there is a diversity of plants. The *mesa* are sold with whole plant parts to enable confirmation with the client of the efficacy. This reduces the need for complex regulatory systems associated with processed medicine. While *hembra* and *macho*, *completo* and numbers of ingredients or varieties and colours are used in the classification of ingredients in the *mesa*, they are distinct to specific folk species, varieties and uses or combinations of plants. The trade in mixtures and plants for these uses form an ongoing knowledge transmission of plant properties, uses and regulations for their selection and combination. Throughout the *feria* at Huari specialist stallholders consistently repeat the list of ingredients in the *mesa*, and the specific combinations and regulations for each set of ingredients: if the *mesa* contains the three colours, red, black and white; if it contains the twelve varieties of maize seeds; if it contains the female and male for the different varieties of lowland seeds. Combining the ingredients into groups, and relating each ingredient to rules of colour, number or

form provides a means for rapid checking a mnemonic. These specific selection criteria and the need for mixtures to be complete, to be whole, reinforces cultural norms and provides a common language for specialists to communicate with non-specialists or suppliers through a common cultural context. The use of common cultural values for ingredients and not lists or recipes for plant names enables a highly stable cultural transmission at the *feria* while also permitting levels of variation between stallholders for the ingredients.

At the *feria* specialist stallholders acquired their reputation from their knowledge of the uses, different grades or types of ingredients, and the symbolic cultural context and meanings that regulated the selection and combination of the ingredients in the *mesa*. The Andean community sellers only gave each plant name and use, whilst specialist stallholders would list plant names and illnesses they treated and ask: “What do you want it for?”. On entering into conversations and when making purchases with specialist stallholders further questions were used to reinforce their knowledge and gain confidence with clients. Descriptions of their stock and other suppliers were used to demonstrate knowledge and inform the client about variations, when one plant or variety was better to use than another or if two classes of a single folk species were needed for a mixture. Specialist stallholders also questioned clients about other plants they had purchased. They asked where a plant was bought, for how much and commented on if it was a good price and quality. They were not only seeking information but also forming a reputation, a reputation through which they defined themselves and others by their knowledge. Specialists would also provide key details to enable clients to know if a mixture was complete or if information was false or elaborated.

I was often told:

‘Ask if they know about x ingredient, they do not know they are just making money. That is how you can tell you need to ask for x plant. We who know, use these things. We supply the *yatiri* (specialist Andean healers). They just come to sell and make some money. They do not know about why we need the plants, ask them why, they will not tell you about *Tata* Santiago.....’

Specialist stallholder at Huari 2006.

In this way specialist stallholders were able to demonstrate their knowledge of the regional cultural symbols used to contextualise the rationale for the selection of ingredients and combinations of plants for specific forms of illness the *mesa* were used for. This also set them apart as specialists with cultural knowledge over those who simply resold lists of ingredients. At the *feria* the practice of repeating this discourse enabled the specialists to distance themselves from charlatans. They were not afraid to shout at clients who bought from stallholders who were not known in the local marketplace they came from. This created the distinct verbal frontiers between the different groups of traders from each marketplace. Specialist stallholders made a point of emphasising where they came from or the marketplace they sold in to identify themselves and the group they were with extending the reputation of marketplaces and specialist groups. Stallholders in the central road also recommend other specialists who they trusted if they did not have the required ingredient or knowledge. This reinforced ties and created a network between the specialist traders who would tell clients: ‘tell them I sent you, they will know and will help you’. It was often more important to define their identity and reputation of themselves and their marketplace than to make a sale. At Huari the specialist stallholders were not only selling plants but protecting their reputation and cultural identity as specialists, by conforming to a social code that could be associated with their identity, the *feria* and Traditional Andean Medicine provided the cultural commoditisation of their products.

7.4 Tracing the origin of a traditional Andean medicinal market: Huari from the early 1900s

This section traces how the importance of medicinal plant trade at the *feria* of Huari has been represented and promoted in socio-economic terms and enabled the traders’ independence from state tax and state regulation for pharmaceutical medicine or for processed herbs sold in shops. The description of the *feria* at Huari by the Bolivian Governmental geographic survey of 1890 emphasizes the international and commercial character of the ‘Grand Annual Fair’ (Ballivián and Idiaquez 1890: 46.), over its local social, cultural and economic role in the small town of Huari where it is located. The report describes a temporal and multicultural cosmopolitan centre with ‘commercial transactions of colossal sums’ contrasted against the small rural town and its subsistence economy as a separate social and economic identity. The summary in a merchant’s

ledger from the Huari fair of 1907 also highlights the size and commercial role of the fair for long distance trade, showing product sources forming two categories of commerce among merchants and rural small holders. The description (cited in Wrigley 1919: 65-80) highlights the character of the *feria* as a temporary town and the extension of Oruro city's central commercial zone, listing the presence of 53 shops, 114 tents, 2 hotels, 25 boarding houses, 4 general merchandise stores, 29 shops of coca, 67 saloons, and 31 gaming tables. Order was maintained by 25 government soldiers and by 200 indians patrolling in bands of 50. The wholesale trade was set in contrast to the *mercado de indios* (market of indians), which would have included Andean medicine, considered to be subsistence base and of little economic importance to the nation.

The opulence of the *feria* was linked to its role as a luxury exchange centre with imported goods and private owned products, produced by the owners of haciendas and mining centres. This social identity of the fair was formed around the atmosphere of a temporary town, with the communal smallholder peasant (or *indio*) market in a separate sector. In the commercial sector were the ever-present entrepreneurial merchants and gamblers. Here fortunes and estates changed hands on the roll of a dice.

This stands in contrast to the current image of the *feria* and the social identity of the rural town and 'traditional market' formed of rows of retailers and itinerant traders, with the small stalls that dominate the landscape of the current *feria* at Huari. In 2006 the *feria* had no obvious temporary large shops, storehouses, banks or security. The early 19th century fair was under the municipal control of the neighbouring town of Challapata. The early *feria*'s identity is located in the privately owned commercial trade of products from saloons, shops and services, with a national identity drawn from the tax revenue with little direct economic value to the town of Huari itself apart from revenue from supplies to traders at the *feria*.

During the first part of the 20th century the *feria* converted from a centre of international commerce to a rural *feria*. In 1928, the municipal report for Oruro considered the *feria*'s international commercial importance to have fallen due to the development of other forms of transport, primarily the railway and roads that replaced mules. The continued growth of Oruro city created a centralisation of trade into municipal run

marketplaces and the *tambos* owned by *fincas* (*Hacienda*) or merchants, for urban and interregional redistribution. Towards the end of the 1940s the annual Commercial and Industrial *Feria* of Modern Oruro was created in the northern sector of the city. International import and export, and redistribution of rural produce took place in the city through the newly refurbished central markets and the annual *feria* of Modern Oruro. The rural agricultural economy was based on the *feria* of Huari and received national and international support. In 1958 the *feria* was described as a fair of agricultural and livestock and the *ferias* of Huari and Challapata were declared duty free to aid the rural economy. The fairs were also supported by the international *Servicio Agrícola Interamericano* (The Inter American Agricultural Service) who funded the irrigation of two thousand hectares of land in the region and donated 3 million Bolivians (£300,000) as prizes to the best exhibitors in the *feria*. This positioned the fair of Huari and the products as rural, localised and the subsistence activity of the rural indigenous communities, while the formal commercial market and informal specialist traders were identified with the city's marketplaces. However, the medicinal plant sector of the *feria* remained distinct as it combined the informal commercial trade of medicinal plant products that supplied the city and country. The medicinal plant trade remained centred in Huari and not in the city centre.

7.4.1 The recognition of traditional Andean medicine at the Annual *feria* of Huari

The description of the *feria* in the first half of the nineteenth century, given by elder residents of Oruro city and found in reports of the period, depicts a diverse commercial market called the '*Gran Feria*' (Great Fair) with no reference in particular to medicinal plant products. However, they do highlight how the *feria* served the mining centre of Oruro city, where Andean merchants linked commercial centres of the Andes with international trade. Medicinal plants and traditional medicine did not play a major role in local politics, and trade was defined as part of the rural subsistence of peasants, while it was commercial industrial trade that paid taxes to local government and the state.

Descriptions of this period by residents of Oruro city referred to it as its 'heyday' (see Sikkink 2010; 68), supplying imports of international livestock of the southern and central Andes, used to stock the haciendas and *ayllus* (communal-owned land) of Oruro along with luxury goods imported from the cultural centres of Europe and America.

Caravans of hundreds of mules took two to three months to arrive. The *feria* was formed of two parallel social and economic spheres, the main agricultural fair and the medicinal plant market. The medicinal plant market is made up of commercial long distance trade, the informal traders from Oruro city and the rural community or small holders producers. These form four exchange circuits: 1) local production and exchange in the southern Altiplano, 2) interregional redistribution of produce 3) long distance imports, and 4) that for urban products. The distinction between these different markets is defined by their role in the wider social and economic context of Bolivia, which have played an important role in defining the social identity of the fair at Huari and that of medicinal plant knowledge.

7.4.2 1974: Santiago de Huari, a souvenir of the international *feria* of Huari

By 1974 the *feria* at Huari had transformed its social identity from a rural agricultural fair to one located in the town of Huari as the ‘International fair of Huari’ symbolised by a modern image of Santiago de Huari. The 1974 *feria* of Huari was promoted as the *Feria Internacional*, with pennants made by the municipal authority reading ‘A souvenir of the International Fair, Municipal of Huari Bolivia’ (figure 20). The *feria* was promoted as an international event by the municipality of Huari, an identity formed from its economic past and social present. The pennant depicted Santiago de Huari, the patron saint of the town, as a musketeer riding a horse, wearing a dashing lilac outfit and drawn in the style of popular movie heroes and comic books of the period.

This image demonstrates the move from a local identity to international imposed ideals and values, driven by the conversion of indigenous *indios*, multiple ethnic groups of diverse social class, into the single lower social economic class of *campesino*, subsistence small holders. In doing so, the ‘indigenous’ products and knowledge were now related to the poor underdeveloped *campesino*, a category marked down by the middle class. Folkloric expressions were celebrated and encouraged over ethnic groups, with the idea of promoting a ‘national’ identity. *Mestizo* forms of folklore were celebrated as a national identity located in urban centres. The ethnic identity located in *Tata* Santiago and the basis for the traditional medicine was syncretised with the national ideal of folklore, through the image of Santiago in a lilac suit, reflecting the popular culture and style of the 1970s, and European perception at that time.

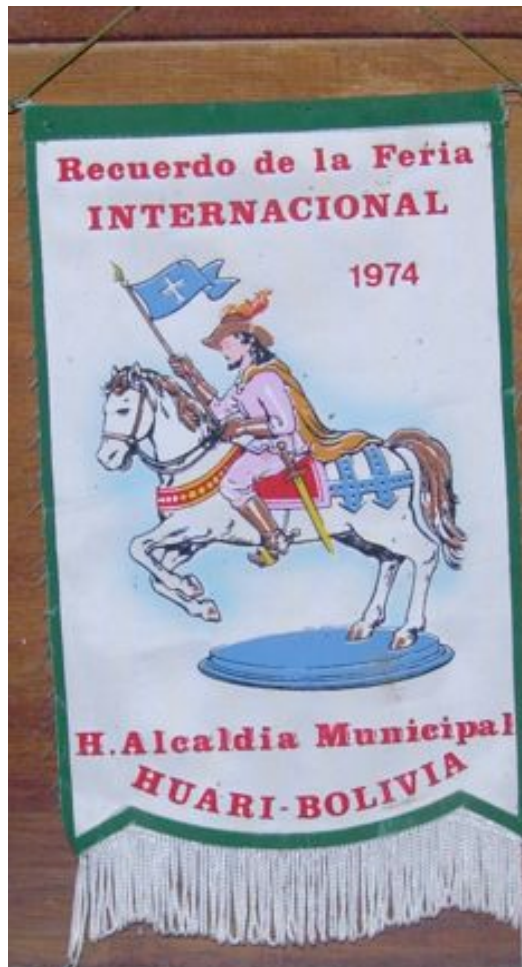


Figure 20. The banner for the annual fair of Huari in 1974. The text reads: ‘Souvenir from the International Fair 1974, courtesy of the municipal major. Huari-Bolivia’

The image of *Santiago de Huari* in the banner gives little indication of the importance or inference of ‘indigenous’ or ‘traditional’ medicinal plant knowledge at the *feria*. The actual figure of *Santiago de Huari* in the church (figure 21), depicts the colonial carved wooden figure dressed in an army officer’s uniform for whom he is the patron saint, he holds a colonial sword raised and shield, mounted on a wide-eyed horse which rears over the trampled figure of a defeated Moor.



Figure 21. The figure of Santiago de Huari in the Church of Huari.

During the present *feria*, the figure of *Santiago de Huari* is adorned with offerings of coca leaves, money and cigarettes by medicinal plant traders. For the people of Huari and the region of the Azanaque Quillacas, Santiago de Huari is symbolic of the hillside and their health. He is symbolic of healing in the region and combined with the two other *apu* (Quechua: site of cultural significance in the landscape and for performing offerings) located on the hills either side of the town of Huari, and forms the centre of healing for the region of Oruro. This identity is drawn from Andean history and stories of the region's past and used to tie the authenticity of the plants' healing properties and trade at the *feria* to an Andean cultural system. The interpretation of Santiago de Huari as a Catholic saint and as the Andean healer reflects dualistic interpretations of traditional medicinal plant knowledge. For traders who attend the *feria*, *Santiago de Huari* forms the cultural basis of the Andean institution for medicinal plant traders and provides authenticity, adding cultural value to their products, and is a social mechanism for transmission of knowledge and regulation of trade. Through *Tata* Santiago de Huari traders can repeat the stories and myths that define traditional Andean medicine. They can use traditional forms of story-telling to record the ongoing interrelation with the environment where *Tata* Santiago forms a mediator and enforcer of social norms for trade.

7.4.3 1984: the construction of a traditional centre of pre-colonial exchange

Following the rise of popular movements in government, and political changes to municipal divisions for rural areas in the 1980s, Huari became the capital of the new province of Sebastian Pagador in 1984 (Alba 1987), and separate from the now-neighbouring municipality of Challapata, which had previously run the annual *feria*. This new political configuration was formed using colonial records based on Inca land divisions and located Huari historically as a pre-colonial centre known as the *Señorío* or *Ayllu de los Uruquillacas*, *Seigniorship of the Uruquillacas* (The land or dominion of the Uru ethnic group of Quillacas) (Espinoza, in Alba, 1987). This new status as a municipality enabled Huari to compete for funding directly from the department of Oruro and not as an annex of the municipality of Challapata. This initiated a competition for departmental funding between the two municipalities, where their status was measured through the size of their *feria*.

Huari has retained its monopoly position as the largest market for ‘traditional medicine’ with direct wholesale suppliers of products from the coast and southeastern lowlands, larger than other annual markets held in rural towns. The presence of *Tata Santiago* in Huari has enabled it to remain the social-cultural centre for traditional Andean medicinal plants. The annual market in the neighbouring town of Challapata has come to dominate the *feria* of Huari in recent decades as the centre for regional agricultural produce, but the medicinal plant trade at the Challapata *feria* is only a shadow of that found in Huari. The traders in Challapata are itinerant traders and retailers from Huari, and secondary markets in Oruro, referred to as *kapachaqueras* who sell traditional Andean medicine plants mixtures and the *mesa*. The only fresh wholesale plants to be found there are locally sourced from the high mountains, which could not be sold in Huari. The merchants from Oruro and La Paz central marketplaces with large stalls, along with the *misterio* and the wholesale of dry products that characterise the *feria* of Huari, are not found in Challapata or the other annual markets held in towns of the Altiplano. This characteristic of local *kapachaqueras* of the town where the market is held and *kapachaqueras* from the city’s outer marketplaces combined with local peasant suppliers of fresh plants to characterise the rural *feria* and outer Junin marketplace of Oruro city. While having a more important economic role in the national trade, Challapata and other rural *feria* have no equivalent to *Tata Santiago* and have remained secondary for Traditional Andean medicinal plant trade.

7.4.4 The 2005 *Feria Internacional del Janpi* and local traditional knowledge

When I visited the annual *feria* of Huari in 2005 it had been renamed the *Feria Internacional del Janpi* (International Fair of Medicine) by the municipal authority of Huari. There was no sign of the 1970s lilac Santiago de Huari and the new title was displayed on a banner over the entrance to the town and *feria* which read: ‘The Municipal Government of Huari welcomes you to the International Fair of *Janpi* 2005’ (figure 22).



Figure 22. The welcome banner at the town entrance, *feria* de Huari 2005.

The banner also had sponsorship from the firm producing the local lager in Huari. The category of medicine was formed from the use of the word *Janpi* (also spelt and pronounced *Jampi*) meaning ‘medicament’ in Quechua, or *hampi* in Aymara. Although the term is associated with the neighbouring Quechua-speaking valley region of Cochabamba, where healers from the rural area are known as *jampiri*. *Jampi* was not a clearly-defined term used in the marketplaces of Oruro by traders for medicine, but has been used by academic and external groups to locate medicinal plant knowledge within

the culture of the ethnic Aymara of the region. The use of the word located the medicinal products, their associated knowledge and forms of use in the rural area. As a word of non-Spanish origin, *Jampi* combines the ‘open’ marketplace location of the category of medicinal plants in the rural setting with the ideals of ‘indigenous’ and ‘traditional’. This is an identity used to promote the municipality of Huari and attract secondary sources of governmental funding for the development of tourism.

7.4.5 2006: the creation of separate ‘natural’ and ‘indigenous’ medicinal plant categories

When I visited the *feria* the following year in 2006, there was no banner promoting the International fair of the *Jampi*. The fair had been promoted in Oruro with posters produced by the municipality of Huari (figure 23). The posters’ title read ‘Feria International 17 to 24 of April, *janpi*, Huari 2006’. The word *janpi* was in lower case and with an italic typeface, printed faintly between the date and location of Huari, which were both printed in clear bold typeface and larger font. The lower section of the poster lists the sections of the *feria* as Industrial, Artisanal, Livestock and *Medicina Natural* (Natural medicine). While in 2005, the ‘Traditional indigenous’ *Janpi* was used to promote the fair to the wider international tourist and consumer, in 2006 the *feria* was defined by rural development, with industrial products as modern and the traditional medicinal plants as *Jampi*, an underlying and separate category. ‘Natural’ medicine reflected the modern commodity for clients in the city of Oruro and industry, where the category of ‘natural medicine’ has a higher economic value over ‘traditional medicine’, and *janpi* as rural household medicine and knowledge.

The separation of the *feria* into categories of general commerce and medicinal products also recognises these as separate economic, cultural and social spheres. Regional agricultural, livestock and industrial commerce have financial support and government regulation, while the medicinal plant trade remains independent of national regulation and support for production. The addition of the title of ‘natural’ medicine reflects the changing government position in the regulation of production and distribution of medicinal plants and registration of practitioners. The ‘natural’ reflects state regulation of medicinal plants located in a botanic taxonomic classification in the national Herbarium plant collection and pharmaceutical properties of plants and biomedical illness classification, as opposed to rural classifications and lexica for plants, medicinal

products and illnesses. The title of 'natural' links this category of medicinal plants to international criteria for natural medicine and pharmaceutical products regulated by national bodies and with packages with written names, instructions, lists of product ingredients, that are recorded in a state register. This has created two separate categories and types of medicinal plant knowledge and identities for medicinal plants. The development of the 'natural' category followed the election of the president Evo Morales in 2006 and promotion and development of 'national' modern industrial products from 'indigenous' local use of plants, the 'natural rural' and 'indigenous' identity as modern and industrial commodities, national products with local ethnic identities.

The bottom of the poster has the new internet site for the Municipality of Huari indicated and advertises the 'Huari' lager '*Pureza de Origen*' (Purity from origin) to complete the picture. The internet site leads in turn to the description of the *feria* given at the beginning of this chapter. The advertising for the lager demonstrates the use of local Andean products of natural origin combined with industrial processing, creating a natural origin and local knowledge in a modern product. The three pictures used on the poster are of the medicinal plant sector. The first shows the sacks and boxes of *misterios* used in Andean offerings for *Pachamama* (Mother Earth), health and prosperity. The second shows large sacks of dry plants traded for healing, and the third picture is of a woman dressed as a *mestizo* or rural market trader with a knitted woollen hat, shawl, the pinafore of market sellers and a jumper, sat on a small stool, with over thirty small bags of dry plant parts and minerals used to prepare healing mixtures and offerings.

The poster demonstrates the revaluation of the use of the Quechua word *janpi*, from 2005, for 'traditional' 'indigenous' medicine to one located in historic and local origin as a form of commodity for the cosmopolitan 'natural' medicine and not market traders or rural ethnic groups. The images are not of indigenous people selling single plants to supplement their agricultural subsistence, or modern industrial factories, but of wholesale merchants and specialists, who dominate the medicinal trade and that of dry products associated with ritual offerings, not processed packages of healing products nor traditional fresh plants. This is parallel to the shift in national policy to support agricultural development for the municipality of Huari to promote itself and the *feria* for modern agricultural commerce and not traditional local knowledge.

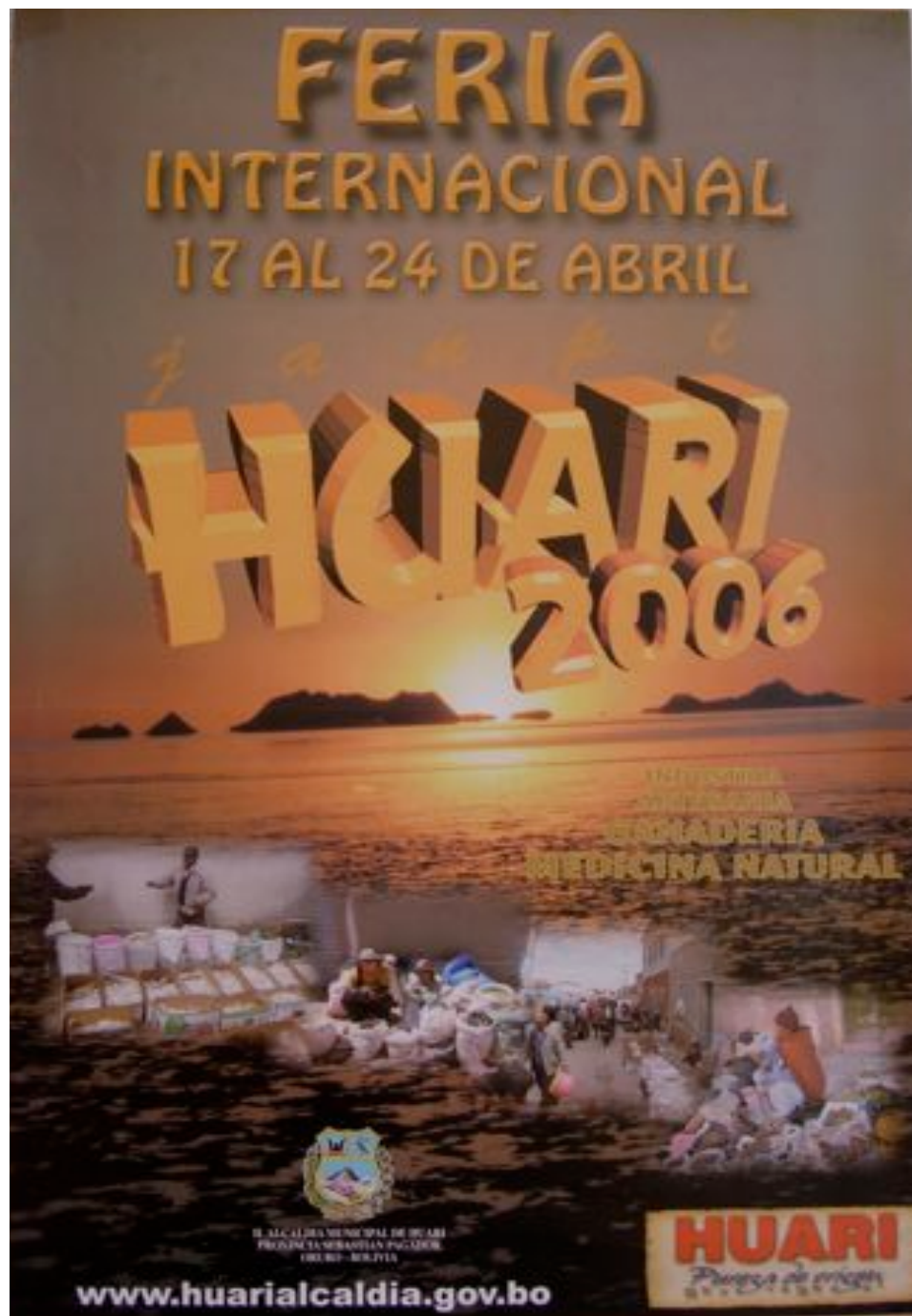


Figure 23. Poster for the 2006 annual *feria* of Huari.

The income from the *feria as janpi* is limited for the municipality of Huari, with medicinal plants forming only an additional subsistence income of informal trade with limited taxable revenue and minimal income from the rent of space to traders at the

feria or governmental support. In contrast, the agricultural fair plays a more important role for the local economy as the primary export of the municipality, with potential for international and national government support. The *janpi* as a national and regional economic tool provides little benefit currently for the town in terms of local government and external non-government investment, but reinforces the image of an ‘undeveloped health system’, perhaps to justify the call for international and national funds for the development of health facilities.

The separation of the annual market at Huari into the International *feria* and *feria* of *janpi* has also drawn differences in the timing and physical space occupied by the two sectors and forms of trade. The trade in medicinal plants begins over a week before the main *feria* opens to the public. The section for medicinal plants is separate from the main *feria* and set in the roads parallel to it. The general *feria* stretches along the main road of Huari some 2-3km, passing the main plaza and ending at the basketball court. Over a week before the *feria* opens to the public or other commercial traders arrive, the medicinal plant sector is dominated by wholesale trade. Traders arrive with large sacks of stock that are sold directly to other urban and regional distributors. By supplying retailers directly before the main *feria* begins they are able to avoid the costs of large pitches at the *feria* but capitalise on the high number of traders from both north and southern market regions of Bolivia. Some traders do stay while the *feria* is open to the public, reserving a small stock to sell from a single pitch, creating a complete monopoly of their specialist products. Retailers benefit from Huari by getting direct access to merchant suppliers’ prices and can stock up for the year.

The high number of wholesale traders and the *kapachaqueras* who dominate the centre of the *feria* define the character of traditional products. *Naturistas*, rural producers and local retailers play a minor role at the *feria* occupying the outer zones of the medicinal plant sector. The dry seeds, resins and *mesa* mixtures define the products at Huari and the socio-economic institution the traders represent. The imposed category of traditional ‘ritual’ medicinal plant, frees the products from classifications of local medicinal knowledge, from the plant’s pharmaceutical healing properties and from descriptions of mixtures by *naturistas* and the national medicinal plant identity. The *mesa* mixture remains the most important product here and dominates in importance over fresh plant mixtures used for purely biomedical illnesses.

7.5 Summary

The annual *feria* of Huari is defined in social and economic terms as a traditional Andean market due to its location in the rural area and the history of trade in the city. The presence of the Andean deity *Tata Santiago* enables the traditional Andean market to become a ‘Traditional Medicinal’ plant market. The combination of plants from the lowland, and from across the Altiplano, and which are only available wholesale at Huari, enables traders to monopolise trade in the mixtures of plants known as *mesa negra* which are used for healing. The combination of the distinct selection of plants and *Tata Santiago* create the social category of ‘Traditional Medicinal plants’ for the *mesa* mixture located in the rural area and in Andean beliefs of health related to offerings. The mixture uses both Andean explanations of the cause of illness and the explanatory model for how illness is cured which enables it to be separated from Traditional Andean herbal medicine.

The *feria* creates a location for forms of knowledge transmission that would not occur in other market systems. It provides an opportunity for buyers and suppliers to meet directly reducing loss of knowledge along the market chain. The *feria* also provides an opportunity and cultural space for horizontal transmission of knowledge within families and communities who supply produce. The designation of the *feria* and its products as traditional Andean medicine enables traders to retain cultural systems of classification of plants and medicine outside of state intervention or other regulatory bodies. The *feria* is a unique system that incorporates Andean values that prevent over exploitation and enable redistribution of chemical resources and knowledge about their medicinal value. Specialist traders use Andean systems of classification to communicate with other groups and mixtures are verified by not selling parts which are not identifiable. The specialist stallholders from central city marketplaces use communal experiences with traders to enable transmission of cultural values and knowledge along the market chain, while their reputation and cultural identity is defined by their knowledge of traditional Andean *mesa negra* mixtures and flora from multiple regions.

Chapter 8

Cultural Identity and Variation of Andean Herbal Medicine and *Naturista* Herbal Medicine at the Annual Market of Oruro City

8.1 Introduction to the cultural identity and category of natural herbal medicine

This chapter analyses how the cultural identity and category of natural herbal medicine is constructed and defined at the annual market held in Oruro city, and how Andean social mechanisms that regulate herbal medicine differ from state systems. The category of medicinal plants and the associated knowledge of the plants used as medicine differs for each location of the market or *feria* (fair). To understand how the category of medicinal plant knowledge is constructed in each new social setting provided by the marketplace requires an understanding of the social and economic history of marketplaces and representative bodies of different medical beliefs and products in Bolivia. This enables the local identity of the marketplace and its actors - the consumers, merchants and producers- to be placed in wider national and international contexts. Specialist medicinal plant stallholders use Andean explanatory models of health to justify the efficaciousness of their products and differentiate themselves from the traditional Andean medicine *mesa* mixture and the *naturista* healers trade in medicinal plants. This chapter compares the cultural identity of Andean herbal medicine with other annual markets, and the social mechanisms used by specialist stallholders of Andean herbal medicine at the modern market, held in the suburbs of Oruro city, with those of the *naturista* healers who are regulated by the state.

How a medicinal plant's social identity is formed and its use defined as efficacious, changes and differs as criteria and values are drawn from wider social divisions. These classifiers, indicators and criteria include the product's origin, place of processing, packaging, form of consumption and location of sale, and are related to wider social contexts and cultural explanatory models for health. In the marketplace, traders use

their identity to differentiate themselves from other groups and promote their products. In Oruro, the categories of 'traditional' Andean medicine, Andean 'herbal' medicine and 'natural herbal remedies', are used to define the types of knowledge and forms of medical plant products. Traditional Andean medicinal plant knowledge is associated with indigenous ethnic groups, giving offerings or performing rituals, and is located in the notion of 'indigenous' and the rural area. Herbal medicinal plant knowledge is located in the urban city space, and is associated with fresh green plant material, 'natural' modern bio-medical laboratories, pharmacies and biomedical packaging. However, there are distinct variations in the explanation, knowledge and social mechanisms regulating Andean herbal medicine mixtures that mean they differ from those prepared by natural healers who are regulated by state institutions. By comparing the explanatory model and rationale for the selection of plants for mixtures between Andean herbal specialists and *naturistas* it is possible to identify variation in the types of knowledge they represent and transmit along the market chain.

8.2 The development of different categories of herbal medicine at the annual markets of Oruro

By tracing medicinal plant trade from its historic roots in rural fairs to the current forms in Oruro city's marketplaces and trade fairs, it is possible to unearth the different socio-economic criteria used to define the category of herbal medicinal plants and variations in the types of medicinal plant knowledge the category represents. At the beginning of the 20th century the most prominent Central Andean annual fair for Peru, Argentina and Bolivia was held at the town of Huari, 140km south from Oruro city. In the 1930s the annual fair of the town of Huari was joined by a series of rural annual and weekly fairs held at towns outside Oruro city. These rural fairs were promoted by the municipal government to stimulate the rural economy and included the *ferias* of Challapata, Caracollo, Paria, Turco and Lequepalca. Each town sits at a junction between the main trunk road for north-south trade through Bolivia and either the eastern or western trade routes. The rural fairs enabled itinerant trade and developed as specialist centres for distribution of products from different regions of Bolivia. Huari gained national recognition as the international market for traditional Andean medicine from the wholesale of dry seeds from the southern lowlands, the *mesa* mixtures for Andean healing, and urban-based merchants and distributors of traditional Andean medicinal

products (see chapter 7). The annual market of Caracollo, 5km north of Oruro city, is known for the wholesale of fresh plant material from the humid northern lowland *Yungas* region used in Andean herbal medicine. Unlike the international trade in Huari, Caracollo is a rural *feria* with retailers and itinerant traders of medicinal plants. Caracollo is a rural economic institution supplying local people and inter regional distribution of herbs.

During the redevelopment of Oruro as a cosmopolitan city, referred to as *Oruro Moderno* (modern Oruro), in the late 1940s, central marketplaces were modernised in line with European style and an annual fair and trade exhibition was held in the northern zone of the city. The city's annual trade fair was linked to commerce, industry and imported European luxury goods, replacing Huari as the commercial centre. After the lifting of taxes at *ferias* in 1958, the fair of *Oruro Moderno* was extended to include regional merchants. Oruro city's marketplace stallholders took advantage of the change and began to dominate the central trading space. During the 1980s the *Oruro Moderno* fair was renamed the *Feria del Norte*, the fair of the north zone, and its organisation passed from an affair of the departmental chamber of commerce to the residential committee of the Northern zone. In the same period, formal trade and commerce of taxed import and export goods moved into the EXPOTECO (Exposition for Technology and Industrial Products), separating it from the informal trade at the *Feria del Norte*. The EXPOTECO was held at the University Campus and regulated and run by the *Cámara Departamental de Comercio*, Departmental Chamber of Commerce, formed of formal tax registered traders and companies of Oruro city.

The annual *feria* at Huari has retained its role and identity as the central *feria* for indigenous, traditional Andean medicinal plant trade through its rural location and Andean *mesa* mixtures. In contrast to Huari, the annual *Feria del Norte* has become dominated and characterised by the modern urban marketplace and the sale of mixtures of fresh plants, a product whose demand and social identity is formed from the *mestizo* merchants and recent migrants who form the suburb's population. The EXPOTECO exhibition is the domain of established, private, and registered products subject to state regulations and licenses for semi- or fully processed products, requiring regulation of packaging and labels. Here medicinal plants are presented as 'natural medicine'. Each *feria* has its own identity, social institutions, regulatory system and corresponding

category of medicinal plant knowledge. Medicinal plants have adapted and transformed their social identity in each new location and period, along with the medicinal knowledge and institutions that regulate them. The rural, the suburban and the urban commercial fair each present different social settings with distinct local histories and identities, constructed from their location on trade networks and their role in wider social economic divisions of Bolivia.

8.3 Niche markets for medicinal plant products and identity in Oruro

Since the social identities at the market places and fairs are interchangeable and negotiable, the perception of plants as medicine varies from one place to another, underlining the differences between the rural and urban areas, ethnicity and social classes. The three roles in trade described for the *Feria del Norte*, -supply, resale and preparation of mixtures-, provide a guide to social perceptions of categories of rural, *mestizo* and specialist medicines. To understand the variation of knowledge between traders requires understanding the complex cultural and economic niche they occupy. Traders use a number of different strategies to exploit economic niches for the category of medicinal plants in the marketplaces of Oruro. These strategies enable access to natural resources from diverse ecological regions and combine social networks with participation in multiple marketplaces. These strategies are regulated by Andean social mechanisms or those defined by the National Institute for Natural Medicine, who hold traders to regulations that define the form and rationale of their ingredients and products.

Andean medicinal plant traders' specialisation in different products and categories of use for healing create specialist knowledge. Apart from individual plant uses, there are specialists in mixtures: *natural* or *herbal* and *ritual (mesa)*. The roles of supply, redistribution and specialist production are aligned to the social classes: rural peasants provide the supply, specialising in local plants and ecology; itinerant traders from the lower middle class (also referred to as *chiflera*) move the supply to market; and the market stallholders, who have specialist knowledge to prepare *natural* or *mesa* mixtures from multiple suppliers, are from the urban upper middle class.

These specialist market stallholders' products combine biomedical explanations of plant functions with the social and ecological aspects of distribution encompassed in the

Andean cultural institution and socio-political organisation of the *ayllu* and concept of *completo*. In the system of *ayllu*, redistribution of resources is regulated through rituals that need to be complete by incorporating products that are symbolic of the different ecological regions that the *ayllu* extends over. In the Andean medicinal explanatory model, a medicinal product, such as an herbal mixture, needs to be *completo* (complete) to be efficacious. *Completo* uses the dual form and sense of ‘complete’, complete in the ingredients and complete in the ability to cure and address the physical, ecological and social origins of disease. In biological and economic terms, this creates a sustainable medical product formed from multiple products, neither exploiting a single species nor dependant on a single local environment. In the Andean medical system, inclusion of folk varieties of plant species classified as *macho* and *hembra* (male and female) are used to regulate opposing medicinal qualities and prevent exploitation of single plant species for a single chemical compound. Thus, a truly *completo* mixture is defined as having products from multiple ecological regions and species or ingredients using folk varieties of *macho* and *hembra*.

Andean traders’ forms of social and economic organisation differ from those of state-based classification and medicinal plant products, although both are dependant on the same plant material from the central *yungas* region of humid tropical valleys and treat the same illness. The fresh plant material used in the ‘natural’ herbal medicine is sourced from the annual markets of Challapata and the *Feria del Norte* in Oruro and the annual *feria* in La Paz. The annual *Feria del Norte* provides a niche for ‘natural’ Andean medicinal plant products that is exploited by traders from the city’s marketplaces and itinerant *naturista*. The traders from the communities of Condo and Cahawayo who have stalls in the Junin marketplace in Oruro city have a monopoly on the ‘natural’ medicinal plant products. By combining their access to space in urban markets and annual *feria* with kinship ties to markets in La Paz they can access fresh plants from multiple regions used to make the natural herbal mixtures.

The herbal remedies supplied by the marketplaces and *feria* in Oruro address a specific health need that is socially, culturally and economically relevant to residents of Oruro city. Medicinal plant stalls in Oruro city stocked an average of one hundred plant species of dry plants, and fresh seasonal plants for herbal treatments. A comparison of the individual stall inventories revealed little variation between their stock. The wide

range of medicinal indications recorded for plants in the marketplaces of Oruro reflect those recorded for specialist healers in Andean communities of Bolivia (Bastien 1987b; Vandebroek 2003) and the marketplaces of La Paz (Macía et al. 2005). Plants used for disorders of the digestive system, stomach ulcers, liver and kidney pains or inflammation, urinary tract infections and diarrhoea, were well known by stallholders. Plants used for muscular-skeletal disorders, bruising and swelling were also well known, although plants used for more serious sprains, open wounds, fractures and broken bones constituted specialist knowledge. Plants for rheumatic pains, vesicular stones, fever, coughs, colds, viral illness causing septic eruptions, gynaecological problems, pregnancy and childbirth were also well known by stallholders. Stallholders prescribed plants for circulatory and heart problems, respiratory problems, coughs, colds, dizziness or altitude sickness, intestinal parasites and diabetes. Stallholder's responses in semi-structured interviews and observations of trading events found a consensus on folk classification of plant species, forms of preparation and administration, parts used and medical indications.

Both fresh and dried plants and their parts were commercialised as remedies and sold with indications of the quantity, form of preparation, and administration being given verbally to clients by stallholders. Forms of remedy administration were primarily oral ingestion, baths and external application of poultice to affected areas. Muscular-skeletal injury and rheumatism were treated both externally using *cataplasma*, a plaster of crushed herbs, compress or cream and internally with teas. Other application forms include inhaling smoke, vapour, or dust. Application directly to the body included rubbing, an application of juice, smoke, sleeping with plants on the bed, wearing necklaces or carrying them in a pocket. Baths or washes form an important part of Andean remedy administration and medication, and include both washing with prepared waters and sweat baths with individual plants or mixtures. Enemas are also an integral part of traditional Andean administration and medical knowledge, although their use is diminishing and knowledge of plants used for, and the form of, enemas were only recorded from some older stallholders.

An older Andean herbalist at the annual *feria* recalled how in her youth people came to the *feria* of Huari, then the *Feria del Norte* in Oruro for the mixtures used for colonic irrigation, but now they only wanted the mixture of fresh herbs from the tropical

lowlands. The change in mode of application reflects the changing social perceptions and medical models. Before, the enema was prescribed by doctors for biomedical illness and by Andean healers for cleansing and applied to the two explanatory models and social classes. Changes in state and western styles of medication have meant doctors no longer prescribe enemas and favour injections and pills to administer a medication. This has placed the enema in the social category of 'rural indigenous areas'. The recent increase in migration to towns, with migrants shedding indicators of their indigenous and rural social class, has led to the abandonment of the enema, which is now seen as a stigma of their rural origin. The discourse of natural healing enables this new middle class, who are avoiding the stigma of rural peasant medicine, by adopting and using the mixtures which are ingested and related to western ideals of progress, and a modern lifestyle.

Individual plants and mixtures were available in the daily markets of the city and in weekly markets of the rural areas. Fresh local flora was seasonal, while fresh material from multiple market regions were only available during the annual *feria* due to high cost of transportation being balanced by high demand in the *feria*. This meant that mixtures of fresh products were only available at the *feria*. Only specialist herbal medicine stallholders had a high level of consensus for knowledge of the selection of plants and preparation of mixtures for muscular-skeletal disorders, fractures and rheumatic pains which were applied externally, and the complex of multiple plants ingested for fevers, upper respiratory tract, coughs and colds, urinary tract infections, kidney and liver complaints. Consensus on ingredients used in mixtures was high between stallholders, but varied between *naturistas*. Mixtures used between six and twelve plants and variations between stallholder's prescriptions were defined more by availability of flora than individual knowledge. Stallholders followed set regulations for the inclusion and selection of flora for coughs, colds, rheumatism and urinary tract infections using categories of hot and cold. Mixtures of plants for muscular-skeletal injury combined plants' healing properties to address the range of muscular skeletal injury from sprains, fractured bones to bruising and swelling, and were combined with plants to prevent infection if open wounds were present.

The annual consumption of herbal medicinal plant mixtures plays a specific role in the Andean medical system and epistemology of health. Mixtures contained between ten

and fifteen fresh plants and were only available annually at the *feria*. The fresh mixtures were prescribed or advertised by stallholders for the complex of stomach, respiratory or rheumatic illness, described specifically as internal digestion disorders, ulcers, stomach pains and illness, urinary tract infections, kidney and liver infections, colds and internal parasites which could all cause a general feeling of weakness or being run down. The basic mixture was adapted for an individual client's symptoms by adding plants relevant to their specific illness. Considering the reality of the middle class clientele's life in Bolivia, with low levels of hygiene often resulting from using unregulated food outlets and constant travel, there is a high level of intestinal infection and parasites passed on through food. Many of these illnesses are not life-threatening and are not treated or incorporated into national health plans. The annual consumption of the herbal mixture is better understood as part of a medical system adapted to lifestyle, social class and part of a wider medical knowledge, and not simply for the specific illness it is prescribed for. The Andean medical system and epistemology of using mixtures of plants for a wide range of illness is best described as an annual cleansing of toxins and infections more than a specific remedy for specific illnesses. The economic model of annual markets enables the low cost and combination of available fresh flora, while perceptions of healing have defined the form of mixtures and mode of application for a niche market based on social class, and a medical model that fits the consumer's explanatory model. The treatments fill a gap left by national health programmes, provided in a culturally sensitive form.

8.3.1 The historic identity of natural medicine at the annual 'Feria del Norte' of Oruro city

Whilst sharing characteristics of other annual *ferias*, the *Feria del Norte* has its own distinct identity, which defines the criteria and reputation of products sold there. The criteria are drawn from social and economic divisions that define the city's northern district against the rural area and formal commercial shopping centre. Medicinal plant trade in the *Feria del Norte* has a commercial basis with no religious aspect that links traders directly to the district, or to Oruro city. There is no patron saint for the *Feria del Norte* nor for the medicinal plant traders. The products of the *feria* are not considered to have the same blessing and associated social and environmental obligations as those sold at the annual *feria* of Huari, where the local deity 'Santiago de Huari' has become

the patron saint of healing, who oversees the town and plant trade. The *Feria del Norte* identity and associated form of medicinal plants knowledge is firmly located in the growing social class of *mestizos*, formed of recent rural migrants and their role as informal traders and merchants in the city's marketplace.

In Oruro city, the *feria* takes on the local identity of the suburb it is located in, an identity distinct from the rural 'indigenous' *feria*, the 'traditional' marketplace of the city centre or the 'commercial' trade fair, although it has aspects of each of these. Unlike the rural *feria*, the urban *feria* plays the economic role of a regional centre for interdepartmental redistribution, and is promoted as a location for the '*Campesino*', the rural smallholder or producer, to be able to sell directly to the public by the chambers of commerce of Oruro. Local newspaper and economic reports of the 2006 *feria* in the northern district describe the interdepartmental and economic aspect as well as the authentic traditional experience of products direct from regional rural producers. The annual *Feria del Norte* had a turnover of over 30 million Bolivians (3 million pounds) and over two thousand traders, forming a temporal economic and social space in the city and important part of the regional economy in 2005 (personal communication, data from the chambers of commerce of Oruro). This identity distinguishes Oruro city's *Feria del Norte* from the 'local', rural, 'indigenous' market based in household units and identifying the city as the central and most important economic area in the department of Oruro. Although at the same time it highlights the 'traditional' aspect that links the *feria* to the informal economy and rural smallholder, and emphasise the *feria's* economic role as an extension of marketplace trade, separate from the *campesino* or subsistence farmer and rural marketplace, and separate from the city's central commercial shopping zone and registered business and industries represented in the EXPOTECO trade fair held on the university campus of the city.

The administrative department of the municipal of Oruro promotes the *Feria del Norte* as an opportunity to increase economic movement between traders, producers and artisans of the departments of Bolivia, and is inaugurated by representatives of the office of productive development and the *Junta de Vecinos* (Local neighbourhood council) directors. The local newspaper La Patria's Sunday supplement (Sunday the 2nd of May) described the *feria* of 2010 as an opportunity for artisans and producers to sell directly to the consumer. The opening ceremony of the *feria* is a family event that

included participation from nationally renowned folkloric music groups, with traditional food and varieties of drinks typical of the regions of Bolivia. The *ferias*' 'traditional yet urban' ambience, located in the 'modern' northern district, creates an identity for medicinal products as traditional, fresh, of rural authenticity and modern urban values, and not indigenous rituals or simple home remedies.

8.3.2 The social sectors of the marketplace

The *Feria del Norte* extends over three kilometres from the central plaza *Sebastian Pagador* of Oruro's northern district, crossing the train tracks and reaching into the city outskirts and surrounding rural area. The *feria*'s centre is located in the district's plaza *Sebastian Pagador* and along the dual lanes of the boulevard that runs through the centre of the northern district (figure 24). The *feria*'s extent, location and the organisation of each section is overseen by the city's Mayor and the *Vecinos* (neighbourhood) committee for the north district. During the *feria*, security, the regulation of pitch size, pitch rent, their location and the control of produce sales, is carried out by the departmental police and the unit for the defence of consumers of the municipal of Oruro. As with rural *feria*, the urban *feria* has three social economic sectors: 1) the central marketplace with traders from Oruro city's central marketplaces, 2) the middle zone with retailers from smaller markets, and groups of producers with specialist regional products, and 3) the outer zone furthest away from the market and city centre with subsistence farmers offering local fresh products and livestock.

The central section and area of high traffic occupied by Oruro city's market traders has the aspect of the city's central marketplace with pitches forming stands or cubicles of plastic sheet on a frame of poles with the wares displayed on tables. The traders sell nationally manufactured and imported products including plastic, clothes, small white goods and packaged food forming an extension of the city's central marketplaces. The roads running-off the central avenue have different groups of regional artisans, crafts and merchants. The 2006 *Feria del Norte* had an estimated 300 traders and producers of fresh and dry fruit from eastern valleys, and over 100 traders and artisans from Cochabamba with ceramics and pottery. From the south-eastern department of Tarija were the producers of dried apricot, raisins and apples. Merchants from La Paz formed a sector with fresh pears brought in boxes tied with leather strips of cowhide and kiosks with sacks of coca leaf and cigarettes. The roads running off the central boulevard

provided a space for itinerant traders from the tropical lowlands to sit and sell the 50ml bottles they fill with the deep red sap from a strip of bark they cut. The bark comes from the recently acclaimed *Sangre de Grado* or *Sangre de Dragon* (*Croton lechieri*), from the eastern tropical lowlands, which is exported internationally for its recently confirmed natural curative properties. Articulated lorries and trucks from the lowland department of Santa Cruz flank the outer roads extending out over half a kilometre. Their cargo of sacks of rice, wheat, and dry cereals are sold wholesale to distributors for Oruro and other departments.

At the end of the main market centre, the *feria* crosses the train track and in the unpaved open area extending into the rural area, forming a peasant market referred to by residents of the city as *Mercado de Indios* 'Indian market' or *Mercado de Campesinos* (Market of Peasants). Families from rural communities in Oruro and the neighbouring upper eastern valleys of Cochabamba and La Paz form an encampment and sell surplus from household agricultural production and wild plants they collect and display in piles or spread out on a plastic sheet or cloth on the ground. The sector is characterised by distinct colours of rural clothes as opposed to the urban attire of *mestizo* or *cholas*, in the central sectors. Here the traditional *p'ampaku* scent fills the air, a typical local roast of Andean tubers and meat cooked with *thola* wood in an earth oven. Over two kilometres from the central Plaza *Sebastian Pagador* is the outer-most area of the *feria*. Here are *chicha* tents, with fermented maize and fruit beer from Tarija and Cochabamba, located alongside a huge open field for livestock. The livestock are located outside the city limit for reasons of hygiene, as are the *chicha* because of the drunks and fights that flow from the tents. The outer area of the *feria* thus represents the rural economy, reflected in the products and the medicinal plants, household subsistence products not specialist products. There is a stark contrast, indicative of the huge social and economic divide, between this market and the central urban market with its well-constructed and clean stalls and tidy tables with processed and packaged goods.

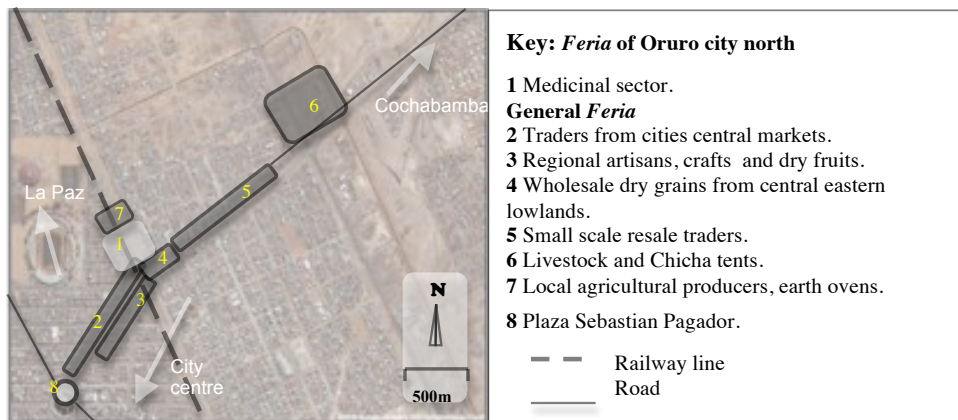


Figure 24. Plan showing sections of the annual *Feria del Norte* of north Oruro city 2006.

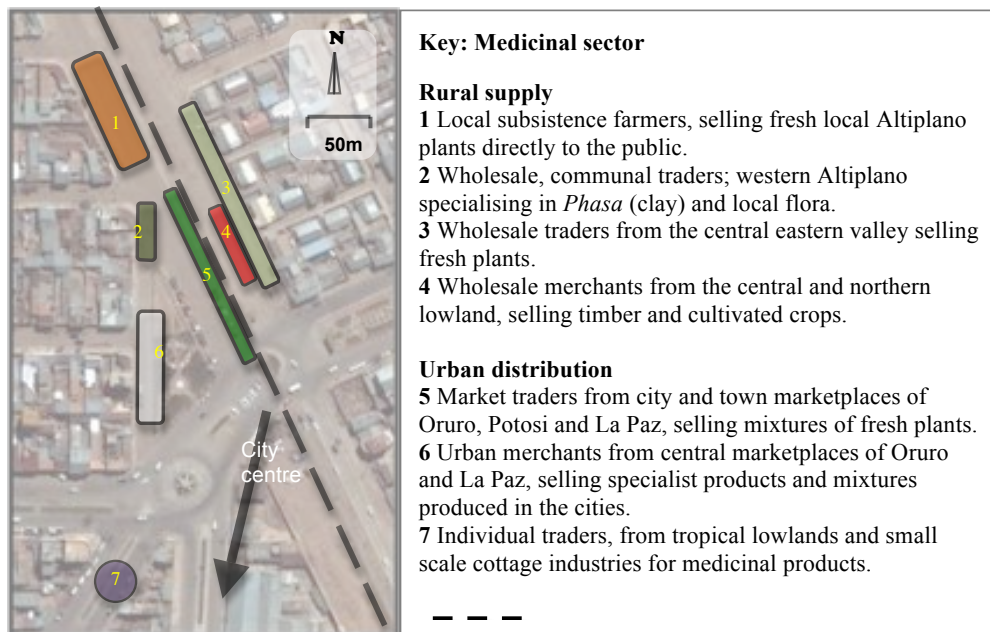


Figure 25. Plan of traders in the medicinal sector, annual *Feria del Norte* of north Oruro city, 2006.

With regard to the sale of medicinal plants, perpendicular to the central boulevard of the *feria*, the medicinal plant sector extends from the central paved area into the rural unpaved *campesino* sector that marks the *feria's* outskirts. The medicinal plant sector has six groups of traders (figure 25). The suppliers of raw fresh plant material include one group from the central eastern valley of thirty families with a diversity of twenty plant species between them, and a second group from the western Altiplano of Oruro of over thirty families with a diversity of around twenty local plants. No more than five

merchants were present at the *feria* supplying wood chips and medicinal products from the lower northern valley. The specialist traders formed two groups: one group of over forty traders extended along the train track selling the herbal mixtures of fresh plants; the other group of specialist traders selling resins, seeds, *mesa* mixtures and other traditional Andean medicinal plants were located in a block next to the central boulevard. Thus, the medicinal plant sector overlaps what are otherwise distinct parts of the *feria*, linking the rural sector, with fresh leafy plants and raw material from the countryside, with the urban central marketplace, with dried processed goods and mixtures. However, within the medicinal plant sector, the social divisions still provide the fundamental set of socio-geographic boundaries for classification and identity of the medicinal plant products, and this is clearly exemplified in the differences between Andean Natural Medicine, discussed next, and the medicine of the *naturistas*, which follows.

8.3.3 Andean ‘natural medicine’: a niche market in the urban *feria*

The traditional Andean health model places value on a medicinal product being efficacious when it is *completo* or whole, having multiple ingredients from the different ecological regions. This reflects Andean political culture as a whole by incorporating the different ecological regions, ritual offerings for the agricultural cycle, and the redistribution of resources in Andean communities. In the urban *feria* there is a niche market for traditional medicinal plant products that combines the natural medicinal properties of plants with Andean concepts of *completo*. These herbal mixtures are distinguished from the ritual *mesa* offerings by a biomedical basis for attributing causes of illnesses, but are based in the Andean epistemology of cleansing and prevention of illness through an interrelation with the environment as a whole. The mixtures sold at the *feria* are primarily for common physical illnesses with an emphasis on urinary tract, kidney and liver infections, kidney stones and intestinal parasites, or the minor respiratory illnesses and common symptoms of middle to lower class urban dwellers. In the *Feria del Norte* of Oruro city the traders use their social network and knowledge of Andean cultural beliefs to combine plants in mixtures and to exploit this niche market for complete natural mixtures.

To place the social aspects of the specialist Andean herbal traders into the context of the Andean form of medicine requires a more detailed ethnographic description of trading

at the *feria*. Following how traders use the Andean concept of *completo* reveals a social system regulating the selection of plants for the herbal mixture and a social hierarchy between traders based on the extent of their social network. This also underlies the distinction between the *naturistas*' and Andean 'traditional' medicine traders' forms of regulating mixtures. This is illustrated by an ethnographic account of the daily activities of Andean traders I observed at the *Feria del Norte*.

In Oruro city, at an altitude of 3,700 m.a.s.l., the temperature is four degrees centigrade above zero at half past seven in the morning, when the calm of the southern Andean plateau is broken by the arrival of the first truck to the annual market. Laden with sacks, the truck arrives at the dry open dusty outskirts of the city's northern sector, or Oruro *Moderno* (Modern Oruro) as it was known following its construction in the mid 19th century. From behind a pile of empty sacks and tarpaulin on the other side of the railway line, a small group of women appear, some of whom have been waiting since five in the morning. They begin to walk, then scurry excitedly towards the truck as it pulls up. Before the truck has parked the women are jostling about at its side calling out "*Casera, mi vas a vender a mi*" "you will sell to me your client" (*Casera* is a social obligation between supplier and client that guarantees preference over other sellers), "*Has traido mis sacos Doña?*", "have you brought my sacks Madam?" As the truck pulls to a halt a head appears from on top of the sacks, which are full of plants freshly harvested from the humid lower eastern valley. The woman, wearing a bowler hat, stands up on the sacks and orders the two male helpers to start unloading. The women at the side of the truck are no longer a friendly excited group and have formed a virtual scrum pushing and reaching up to catch the first sacks, whilst their accompanying husbands stand back looking on.

The first sack lands among what appears to be, from the point of view of an outsider, a frantic throng of women, but where eventually two sisters wrestle it free and drag it to one side. As the sacks are passed and thrown down, the receiving group combine screams, insults, and laughter when a sack lands on one of the sisters stunning her temporarily. With the sacks unloaded, and a relative calm restored, the owner now comes down from the safety of the top of the truck to negotiate payments. The receiving women are now rejoined by their husbands, who weigh the sacks with pocket Roman scales. Prices are rapidly negotiated with buyers, who are now united in

shouting insults at the seller and not at each other. The purchasing traders' banter includes lines such as, 'it's not worth that', "it's not good quality" and "you don't even know what it is used for". The buyers combine their urban social status and savvy or know-how of plant names and uses in the city to gain bargaining power over their rural suppliers. The establishment of a social hierarchy and the manipulation of knowledge as social status enables traders to use knowledge of plant names, uses and mixtures used in Oruro to gain a social and economic advantage over suppliers and negotiate lower prices for stock from suppliers.

The first spoils of Oruro city's annual market, *Feria del Norte*, are dragged back to the women's pitches on the other side of the railway tracks. Here, away from the trucks, the sacks are opened and checked, the sisters laugh and joke with the other women about the delivery and the good price they were able to negotiate. Their tactic paid off, they gained the monopoly of *zarazaparilla* roots (their folk genus for unidentified species of tuber root from lower *yungas* region), which they now proudly displayed to other traders who are arriving. The traders, residents of Oruro city, mark out their pitches for the *feria* with stones and plastic sheets that form a line along the train track. The trucks continue to arrive and unload, forming a parallel line of tents with piles and sacks of fresh produce laid out on the ground on the far side of the train track. As each truck arrives the sisters take turns, one negotiating new stock, whilst the other guards their pitch and sells to other traders who are arriving.

It is the need to cover multiple locations that make the family unit fundamental in trading strategies within the *feria*. With family members scouting for products and information on availability, prices, quality and knowledge of uses, other members are able to secure pitches and protect stock. When the *feria* is officially opened to the public three days later, the open ground has converted into the sector for medicinal plants and natural healing. In the area of suppliers, the trucks are gone and now only women sit with small piles of single species plants, some organised as mixtures. The suppliers are dressed in the attire of a lower class rural *chola* retailer or *campesino*. Each seller has three to ten different plant species from a single ecological region and use local common names for the plants. The buyers, specialist medical plant stallholders of Oruro, have formed a parallel line of some thirty traders separate from the suppliers, and on the far side of the train tracks nearest to the town centre, and have

been joined by specialists in Andean herbal medical products from La Paz and the *naturista* medical plant traders.

The line of traders along the train track form the character of the Andean plant trade at the *Feria del Norte*. The number of traders, now over forty, is higher than the number of suppliers and the trade in fresh herbal mixtures eclipses the other groups of *kapachaqueras* and specialists in Andean medicine, with their dry products and *misterio* from Oruro's central marketplace. The use of fresh plants as mixtures by the traders of the city's open marketplace on Junin street generates higher volumes of trade than that of the other sectors, and their fresh bright colours characterise the sector and niche market created at the *feria*. The *feria* is outside the jurisdiction of municipal and state regulation for distribution and regulation for *naturista* (natural) plant products, forming an open market. The specialist Andean herbal stallholders place their mixtures as superior in quality to the *naturista* and the state system through their claim to sell mixtures that are *completo*, and not simply to have the list of plant ingredients. The natural remedies are accepted and contrasted as better conforming to modern scientific validation of the plants' properties. The mixtures are prescribed for illness of physical and biomedical causes and Andean explanations for the cause of illness including *susto* (fright) and *aire* (an encounter with the wind).

The specialist Andean herbal stalls have a table placed with wares spread out at the front, surrounded by the sacks of produce that form their tent for the night and their home for the six days of the *feria*. The tables display fresh plant parts - leaves, roots, bark, and fruit - arranged into piles; some stalls also have packets of dry plants. The table reflects the urban marketplace in contrast to the suppliers who sit on the floor with plants in piles on a cloth or a plastic sheet. The sisters who set up their stall here have been met by other members of their extended family linked through their community of origin. These include those who trade in the southern city of Potosi and the northern Bolivian capital of La Paz and its satellite city of El Alto. These extended kin relations of the community enables preference for sale and guarantee a monopoly on sources. Many of these members do not set up stalls and only come to buy produce from the sisters in exchange selling their own products. This secures them prices based on market of origin and they are not restricted by the elevated costs of needing to have a pitch and trade at the *feria*. Here like-for-like reduces the product's value as both are

equally valuable to the other party for their abundance or scarcity. The traders are able to use these extended family relations to access products from other market regions at lower prices. This adds to the diversity of their mixtures and their claim for them to be *completo* by having products from ecological regions outside those supplied directly to the *feria*, from the immediate vertical ecological regions.

At the *Feria del Norte*, the suppliers who prepared mixtures offered larger quantities and provide twice as much plant material for the same price as the mixtures offered by the sisters, but they only had plants from a single ecological region, and this reduces their value as complete. The high price and limited availability of other plant species from other ecological regions restricted them competitively. As noted earlier, the Andean form of combining social networks to access a higher diversity of products defines the form of trade and value of the mixture over the physical quantity. Specialist middlemen, such as the sisters, also sell on to the *naturistas* who have shops, and to semi-industrial producers of natural products. They are preferred as a source, despite higher prices, over the suppliers because of their experience in selecting the quality and uniformity of produce, through attending multiple *feria*, and their ability to purchase from multiple suppliers at multiple markets. The *naturista* are a single product trader and often itinerants in the *feria*. Their trading strategy is based largely on increasing the value of products through justification of its authenticity and efficaciousness by using biomedical descriptions of conditions and causes.

During the *feria* the sisters' stall was constantly busy and they sold over twenty sacks of plant material as mixtures. Their stall was the most competitive and drew a constant stream of customers. Customers commented that they preferred the sister's product because it was complete and looked fresh. Their mixture was prepared with slices of roots, different coloured leaves and a slice of citric fruit to present a balanced, fresh green image. The presentation was a form of art, exploiting urban perceptions of what a fresh natural mixture should look like. Their mixture was neither the most abundant nor the most diverse in terms of number of species. A collection of mixtures from other traders, also situated along the train track, revealed that the average number of ingredients in a mixture was sixteen, while the sisters had seventeen. The suppliers' mixtures had no more than ten plants. The unique diversity of plant species the sisters sold was justified by the use of *macho* and *hembra*, the two complementary halves for a

plant species to make it complete. For the root of *sarzaparilla* the sisters used the white *macho*, supplied at the *feria*, although the red *hembra* was from La Paz and not available at the *feria*. The claim for a ‘complete’ mixture was the inclusion of the *hembra* and *macho* parts of two species from different ecological regions. The sisters also included a wood chip from an extended kin relation who sold directly to them at the *feria*. This combination of plants and Andean explanatory model of efficacy used by the sisters for their mixture made it distinct, and gave them a monopoly and a higher value in the *feria*.

8.4 The category ‘natural herbal medicine’ and the state institution of *naturistas*

The development and promotion of ‘Natural’ medicine has been reported in Bolivian and other Latin American countries, referred to as *naturismo* (Sikkink 2010: 136), and ‘alternative medicine’ for Asia and Africa (Hardon et al. 2008). Brunn and Elverdam’s (2006) study of Bolivian *naturistas*, those who prepare, diagnose, administer and commercialise natural products, defines this category as ‘healers who integrate traditional and biomedical explanations in their treatment within the Bolivian health care system’. The regulating body for natural medicine in Bolivia, SOBOMETRA (*Sociedad Boliviana de Medicina Traditional*, The Bolivian Society for Traditional Medicine), identifies two categories of expertise for traditional and natural medicine: the healer or therapist and the seller or agent (Sikkink 2010: 140). By distinguishing the therapist from the supplier the associated knowledge of ingredients’ production and end use is also separated. The distinction between the distribution of knowledge of medical theory to the therapist and regulation of quality to an institution form the difference between the Andean herbal medicinal system where the specialist knowledge is located in the practice of trade and Andean political system of redistribution. This has also created conflict between the two medical systems to define authenticity and authority of Andean herbal knowledge.

The category of *naturism* draws on aspects of traditional medicine and claims authority from it (Sikkink 2010). At the same time *naturism* distinguishes itself from these practices linked to ‘rituals’ in social and psychological realm of healing and oral traditions of herbal practices, placing the fundamental ideology in global health

concepts of biological medicine. By using both bio-medical and traditional sources as forms of authenticity, *naturism* is able to bridge the gap between the traditional rural *campesino*, or 'indigenous' identity, and the purely medical product of higher social class and western bio-medical practice, forming a quasi-traditional medicine. This has placed *naturism* into the social category of *mestizo*. Practitioners are required to register with the national institution SOBOMETRA and natural products that are sold in shops require a license. The license is issued by SOBOMETRA and requires a list of plants identified by their botanic classification, and confirmation of their medicinal properties by the herbarium and pharmaceutical college register and pharmacopeia of Bolivian medicinal plants. Natural product packaging is required to list the ingredients' using botanic names, the form of application, batch number and use-by date, and the place of production requires a certificate of sanitation for artisanal medicinal products. The set of regulations is recorded in the guide to registering semi-industrial production of plants and products for natural medicine, which is available to members of SOBOMETRA. This has created a category of semi-industrial or processed products that do not require the stringent testing or regulation of pharmaceutical products. However the definitions of, and classifications of, plants are only to a species level; they do not include variation in the medical properties of material from different plant parts or regional variation. Further, there is no clear record of how the combination of plants affects their medical properties. These are all types of knowledge that are present in the Andean herbal medical system.

The sale of *naturista* products on market stalls has been a point of conflict in Oruro, a result of the recent surge in the cottage industry for semi-processed natural products. The primary outlets for these products are the urban areas and *naturistas* shops, although their products are also distributed in pharmacies and on the market stalls for medicinal plants in most towns and cities across Bolivia. In interviews, *naturistas* complained that the market stall sellers had no training, are not able to diagnosis patients and were detrimental to their image and status by selling the products alongside Andean offerings and household cures. The typical statement from *naturistas* was: 'What do they know of these things; half of them cannot read'. When questioned about these products, the stallholders claimed they had the right to sell products and claimed no authority over the knowledge. The rise in *naturism* and regulation of sale of herbal

products has led to the requirement for market stallholders to receive basic training in herbal medicine from SOBOMETRA.

Naturism has been created from global ideas of ‘alternative’ health placed in nutrition, wellbeing and the use of diet to complement the biomedical properties of plants. Cures are semi-processed tinctures and syrups for coughs, rheumatism and digestive problems. *Naturism* also claims to cure ongoing problems of digestion and urinary tract, heart conditions, obesity, rheumatic and arthritic conditions. Treatments will often combine recommendations for diet and cleansing with sauna and, on some occasions, colonic irrigation. These findings coincide with Sikkink’s (2010) findings from studies of *naturism* in Cochabamaba. This definition plays to the growing urban *mestizo* administrative worker who is distancing himself from rural roots, and to social elites looking for alternatives to purely pharmaceutical treatments. While *naturism* in Bolivia sees its roots in ‘traditional’ medicine, it forms a distinct category, set of products and form of healing. In interviews, *naturistas* made a clear distinction between their practice and that of traditional healing by not using rituals and not invoking the ‘spirits’ and, secondly, the verification of plants’ biomedical properties. Likewise traditional Andean healers and vendors of specialist mixtures also differentiated their own practices from those of *naturism*.

The market stallholders in Oruro are intricately linked to the *naturistas*, many have family members who are practising *naturistas* and others supplied many of the *naturistas* in Oruro with plants they source from the annual *feria*. But more interestingly still, some of the market stall traders prepared mixtures which the *naturistas* would then sell on. When I questioned one seller about the *naturism* trade and the *naturistas*, she explained, “they come to us, we teach them the mixtures, supply the plants and they go and sell them. Now they want to stop us selling, we have to get ‘carnets’ to sell these now, our mixtures”. The appropriation of herbal knowledge and transformation of the products into a new social category provides a case study of how traditional exchange systems continue to dominate and define secondary products.

While the products require registration, the actual ingredients are not so rigorously checked. The sourcing of products from rural producers remains open to misuse of names and limitations of availability. It is this knowledge of source material that

distinguishes market traders from *naturistas*. It also enables stallholders to retain a level of control, by being able to substitute species under a single common name. For the most part though, the initial mixtures stay the same, locked into a time and place, and thus lose their dynamic characteristics, which would have allowed for substitution of ingredients if a single plant was not available or to fit a patient's requirements. While the products are curing biomedical illnesses, the market traders' knowledge can be shown to be distinct and a result of wider concepts of socio-economic system and the relationship between environment and health.

8.4.1 Biomedical and Andean explanations of natural medicine

Natural medicine practitioners, or *naturistas*, argue that health problems need to be addressed by natural means. Stress, high blood pressure, prostate problems are typical illnesses they treat. *Naturistas* locate the cause of illness in stress '*nervios*' (Sikkink 2010) and poor diet. 'Stress' features widely as a cause for ill health in popular magazines, newspaper and on television in Bolivia, related to the modern lifestyle and the city. The countryside is contrasted as a place to relax, of calm, cleanliness and unpolluted lifestyle and products, such as medicinal plants. Natural medicine encompasses a range of products that originate from plants' 'natural' properties. These are promoted as clean benefits and used to commercialise both health and beauty products.

In the interviews and consultations, *naturistas* emphasised the role of diet alongside lifestyle to cleanse the body. Fresh fruit and vegetables that are not over-cooked are encouraged while red meat, coffee, tea, chocolates and alcohol are restricted. This cleansing of toxins follows European theory on humours. The *naturistas* recognise the importance of diet in maintaining health and its relation to prevention and cure of ongoing problems. It is this aspect of diet, cleansing and reducing toxic intake, which deviates from 'Medicine' and biomedical treatments. The emphasis on diet and cleansing is also somewhat different from traditional medicine, which promotes both social and environmental health, through ritual manipulation of the natural and social environment, and the regulation for redistribution and access to resources.

Thus, *naturistas* differentiated themselves from traditional medicine by not practising rituals, and claim their authenticity from biomedical authorities for the pharmaceutical properties of the plant medicine. *Naturistas* stated their medicine was grounded in

accepted and proven medical properties of plants. Their references and justification were based on biomedical monographs of medical plants, which filled a shelf in one consultation room. Their consultation room mirrors the modern doctor's consultation room, a private space behind the shop front. This distinction from traditional medicine, of a physical location outside the marketplace, regulated by state authority, with printed books, was completed by a set of framed certificates located next to the bookshelf. Certificates were from SOBOMETRA or other courses of healthcare practice they had attended and had stamps and signatures from the authorised municipal health service. The *curanderos* and *yatiri* 'traditional' healers' authority comes from an 'apprenticeship' within the community, and they considered the *naturista* cures to be incomplete if a ritual was not performed, and used this as the basis to differentiate the two systems.

As a group, *naturistas* have developed political representation through local organisations under the umbrella of SOBOMETRA. SOBOMETRA was founded in 1984, by Supreme Resolution no.198771, for "Therapists that practice Native Medicine and Alternative Natural Medicine..... of the indigenous cultures" of Bolivia (Sikkink, 2006: 140). The institution is most prominent in La Paz, where it was founded, and has offices or centres that run courses in each city of Bolivia. SOBOMETRA provides registration for practitioners of traditional and natural medicine. Registration places practitioners into distinct categories based on courses they have completed and types of healing they perform: 1) traditional medicinal healer, 2) *naturista* and 3) specialist healer (ritualist, curandero, bonesetter, midwife). The criterion that distinguishes *naturistas* from *curanderos*, for SOBOMETRA, is the form of training. The bonesetter uses similar plants and knows their pharmaceutical properties, but with no formal training he remains a 'traditional' specialist healer. A practitioner can take courses with associations affiliated to SOBOMETRA. The courses provide the basic training explaining the biomedical properties of herbs and their nutritional benefits, how herbs are applied and the criteria used to identify illness. An official training course offered in Cochabamba lasts a year and comprises courses in pathology, biology, laboratory analysis, diagnosis and massage (Sikkink 2010: 141).

Cochabamba has become an important centre for the *naturistas* along with the satellite city of El Alto, set above the capital city of La Paz. The cities have a row of *naturista*

shops located outside the marketplace with consultation rooms and practitioner associations. This reflects the dominant migrant population and social class, who define themselves by aspiring to shed their rural customs and adopt modern medicine, but not to associate themselves with the medical elite of the city centre. Oruro, however, has a much smaller aspiring middle class and rural origins play an important part in identity. Consequently *naturism* is not so wide-spread and large training colleges and organisation are not present. In La Paz city itself, *naturistas* do not have a set location. The central and most important marketplace for herbs is located behind the plaza and cathedral of San Francisco. Here the *k'oa* and *mesa* mixtures dominate the display for tourist and national users alike, unlike the migrant towns of Cochabamba and El Alto who have few tourists. The shops in La Paz sell the *mesa* in one section while a second section sells fresh herbs. The *naturista* is absent but the boxes of natural medical products are sold on the stalls of fresh and dry herbs and in the *mesa* shops. The picture in La Paz is completed by the municipality naming the road the *Calle de las Brujas* 'street of Witches' and the travel agents at the top of the street selling tours to the Ayahuasca camps in the *yungas*.

The SOBOMETRA conference I attended in Oruro in 2006 provided a distinct picture of the organisation's structure. The first speakers were representatives of the national health system. The conference began with the recently elected minister for health, Jaime Zalles, who had spent his life studying and identifying Bolivian medical plants and had published several 'authoritative' texts. His books list plants using botanic classifications and he describes the plants' medicinal properties following the biomedical model. His books' introductions refer to problems he encountered with misclassification of plants caused by variations and overlap in common names. His speech reinforced the importance of clear classification of plants using a universal scientific name to avoid confusion, and the systematic organisation of illness under biomedical categories. The following speeches lasted forty minutes and included the topics of nutrition and contagious disease, based on national health statistics. Each presentation repeated the importance of using national statistical data on poor health, nutrition and distribution of disease for national public health campaigns, and to justify the placing of the role of *naturistas* within this state policy to improve nutrition.

The final presentation was by a ‘traditional healer’. He presented without a Powerpoint, graphs or any statistics, and while he explained his case the microphone was distorted beyond an audible range, which seemed to reinforce the state statistician’s stance of his technical and modern superiority over the traditional healer. The traditional healers’ argument, in opposition to the state’s imposed health programme, was that an individual could not be cured without also curing the family and community in which they reside. This advice for a policy of healing reflects a genuine understanding of the importance of access to resources in a community and their redistribution as an aspect of health and wellbeing, although its importance fell on deaf ears at the conference. The structure of the professions of qualified doctors and botanists, the authority to which traditional healers needed to model themselves, is the dominant feature of their system, where the state distributes resources in the form of nutritional supplements. These two views highlighted the difference between state health policy developed from urban centres and rural communal beliefs and understandings of the causes of poor health.

SOBOMETRA and the state health system do not recognise the producers of plant mixtures or traders as holding a distinct body of knowledge. The biomedical system places knowledge in the hands of the medical personnel who dictate classification and criteria for a plants inclusion through botanic classification. A problem arises in that *naturistas* are not trained as botanists and do not collect their own material. While they know the properties of plants they are often unaware of how to differentiate between similar species or have clear procedures on which plants to use as a substitute if species are unavailable. While individual properties of plants are understood, how these can be combined and the interaction in mixtures is not a clear body of knowledge for the *naturista*. With this outline of *naturistas*, and the concept of natural medicine, it is possible to observe three distinct forms of natural medicine: 1) the urban *naturista* selling in a shop; 2) the itinerant *naturista* at periodic marketplaces; and 3) the ‘informal’ market stall trader of plant mixtures. The comparison of their point of sale, products’ form, diagnosis and mixture ingredients enable distinctions to be drawn up. This comparison also enables an understanding of the difference between each form of knowledge and the underlying cultural impact on knowledge.

8.4.2 The shop and urban *naturista*

The *naturista* described above uses a shop front with a rear consultation room. The *naturistas*' shops in Oruro are located in the commercial zone behind the lower market Campero and the central high street. The line of three shops has signposts advertising health and *naturistas*. The window display has boxes of natural plant medicine and posters advertising the natural products' healing benefits. Other *naturistas* in Oruro have private consultation rooms in their homes and charge for their services making profits from services over the profit from products. They combine formal office attire with laboratory coats in their consultation rooms that relate to biomedical and state-registered doctors and health practitioners. The books and framed certificates are a symbol of their status and authority in the field. Diagnosis combines listening to the patient's personal circumstances, listening to the chest using a stethoscope, recording the pulse and examining the urine. These combine to provide a diagnosis of the level of stress the patient is suffering, and biomedical classification of high blood pressure and urinary tract disorders. The *naturista* have qualifications and their activities are monitored by the local health system. Their location and reputation draws in clientele from a diverse range of social classes in the city.

Although individual prescriptions vary, they are always provided in the form of a processed and packaged natural medicine developed from plants. The package and indications state use, and the *naturista* is the authority to diagnose and indicate the correct medicine. These are sealed bags with mixtures of dry herbs, tinctures, syrups and plant extracts. It is the ability to diagnose, and not prepare a medicine, that the *naturista* use under the authority of their titles. The *naturistas* distinguished themselves from the sellers of natural remedies in the fairs and markets by this qualification. They considered untrained market traders as charlatans that undermine their authority, although they were in many cases the source of their raw material, and in others the specific list of ingredients used in the mixtures. The *naturistas* also aspire to certify their own products made from plant mixtures with the state and to commercialise them in pharmacies.

In addition to their shops and consultation rooms, the *naturista* extends into the EXPOTECO and commercial fairs. As an official registered business, *naturistas* can practise and distribute products in the commercial fair. At the EXPOTECO the

naturistas' stall was a replication of the shop with packaged natural medicine, including the popular *sangre de dragon* (Spanish literally: dragons blood) (*Croton* sp.), and products for rheumatism, urinary tract infections, stomach problems and respiratory problems. The stall had a selection of certificates stamped by SOBOMETRA and the health authority. The *naturistas* diagnosed patients' cause of illness based on diet and stress in their lifestyle and recommended products for specific symptoms. Products' primary classification was for the illness they cured and packages listed plant ingredients by common and botanic names. Products originated from Peru and Bolivian industries based in Cochabamba. As far as I could ascertain, the products were not repackaged, that is to say as Peruvian products with Bolivian labels. Peruvian products' botanic names were often miss-spelt or simply invented. The Bolivian products listed common names and scientific classification based on Bolivian popular botanic records. The use of the two nation's classifications of plants from common folk names with botanic classification in popular texts that are not always verified by the national herbarium has created a minefield for cross and miss-classification. In Bolivia, a licence for the elaboration of products includes submitting a monograph on the plant or plant species to be used; this is then verified and certified by the national herbarium. However, the material used for elaboration of products is not classified by the herbarium, but by local collectors who are using local folk names and can result in regional variation of actual botanic species used.

The variation in material and common names was highlighted to me by one of the market stall retailers of the Peruvian products in Oruro. The Peruvian products are available from the large warehouses located in Desaguadero, the Peruvian side of the border town with Bolivia located in the department of La Paz on the northwestern side of lake Titicaca. The import of stock is made possible by small-scale 'informal' traders, who are able to avoid the taxes paid by large commercial enterprises. Peruvian products include the *uña de gato* (cat's claw) bark, the *wira wira* plant mixture for cough and *matico* mixture for urinary tract infection, liver and kidney problems. The traders bought the product and redistributed them through the market stalls in Oruro, using extended communal ties and kin groups with traders and market stalls in La Paz. The products conform to import regulations for natural medicine by having the botanic classification printed on the packaging. However, these names do not always match the herbarium records or the same species for the common name in Bolivia. In the case of

uña de gato bark, market stallholders noted the variation in bark colour between Peruvian and Bolivian varieties. The explanation was that the darker bark was Bolivian, and was deemed to be the higher quality and of a high standard, readily available and with better curative properties than the Peruvian. The Bolivian product was not packaged or commercialised as a natural product and as such did not reach such a high value or return. The Peruvian product was packaged and labelled and had a higher value. One market stall seller explained: “the Peruvians are taking our trade, we (the market stallholders) have the plants but no one is packaging and we are not registered as naturists to sell the natural products. We source and supply the products but are losing out to the Peruvian natural medicine market”. The *naturistas* used the packaged product to justify their authority over market stallholders as an official certified, identified product and not an unauthorised plant from people trying to cash in on the market demand.

The case of *uña de gato* bark demonstrates how the market stallholders’ in Oruro have specialist knowledge of the variation in regional varieties of plant species and their availability. This case clearly shows how market stallholders’ knowledge of plant varieties and properties differ from the *naturistas* commercial form which is dependant on botanic classification of species which do not account for regional variation or availability. This also highlights how the suppliers use of common names of plants as natural classifications differ from the specialist classification used by stallholders for plants medical properties and the illness they cure. The case for *wira wira* demonstrates that stallholders in Oruro use the name to identify a chemical property found in plants used for cough and respiratory illness and not a specific botanic species or multiple species found in Peru and Bolivia.

In the *feria*, the *naturistas* locate themselves in the main thoroughfare apart from, but close to, the main medical plant section. A distinct variation of the *naturista* was in the annual *feria* of Huari. Here the ambulant stand, with the mixtures and framed certificate, was accompanied by the white laboratory coat and stethoscope of doctors. This deviation in attire, from the casual clothes of the urban *feria* to the formal medical attire in the rural *feria*, mirrors the exclusive status and value of medical doctors in the rural area. The seller is thus able to distance himself from the unqualified urban reseller at a rural *feria*. In contrast, at the urban *feria* the *naturista* uses the casual urban attire

to distance himself from the medical profession and from the rural and urban market seller.

8.4.3 The itinerant *naturista*

The second form natural medicine takes was exclusive to the informal market and the annual *feria*. This itinerant version exploited a niche from the high volume of traffic at the fairs and the low cost of maintaining a pitch in comparison to a shop. The itinerant *naturista* used the fresh products brought to the *feria* as the mark of authenticity of the plants' fresh and natural healing properties. This category of *naturista* at the annual *feria* is distinguished by the preparation of fresh plant mixtures and not packaged herbal products.

One trader from El Alto (La Paz) had developed a distinct niche in the annual *ferias* in La Paz placing himself in a general trade zone away from the fresh plant mixtures of Andean herbal market stalls. His pitch was a large sheet of plastic spread out on the floor shaded by a pair of large umbrellas formed of two crossed metal poles with plastic spread over them, typical of the rural market trader. He ran the stall with his wife, unlike the first category of *naturista* stalls that were all run by men. The stall had no packaged products and the framed certificate of a certified *naturista* authorised by SOBOMETRA was not present. Centre stage of the stall was a row of mounds of mixtures of sliced plant parts. Behind these were sacks and piles of fresh plant material that were not mixed. Don Juan and his wife sat or stood selecting plants and preparing the mixtures. The preparation of the mixture from fresh plant parts in front of the client highlights the Andean system for validation of authenticity of fresh plant ingredients and removes the need for external regulation of ingredients for processed products. Don Juan justified the efficacy and value of his specific mixture by including two key ingredients, one a tree sap from *el hecho* (*Alsophila cuspidata*), and the *sarzaparilla* root (unknown sp.), both of which are from the *yungas* valley in La Paz. Unlike the other ingredients used in the mixture the two species were not available to purchase at the *Feria del Norte*, Don Juan having collected them himself on trips to the *yungas* region. This gave him a market advantage over suppliers and local traders reselling combinations of plants only available in the *feria*. This mirrors the same strategy used by the sisters at the *Feria del Norte* in Oruro, of including a plant which they had a monopoly on supply. The trunk of the *el hecho* was cut in slices showing the distinct

white-spotted inner section. The fresh slices ooze a gel that Don Juan explains to customers is the plant's curative property. Demonstrations of the gel's curative properties are given by smearing a little on his skin then the skin of the client. This enables the client to experience and verify that their skin is smoother and the plant has a curative property. The mixture is sold using a distinct sales pattern that combines the plant names and the illness they are able to cure.

In conversation, Don Juan explained that his father was a *curandero* from La Paz and he had learnt and worked with his father collecting plants and preparing remedies. When his father passed away he had taken over the business. He knew where to collect plants and which to buy at the *feria*. The most interesting part of his claim to authenticity is located in how he learnt. His story began with his father and how he had learnt the traditional medicinal plant remedies and ingredients from him, the properties of the plants and formula of mixtures that was passed down from generation to generation. This provided validation of his Andean knowledge. This was then elaborated upon by what appears to be a contradiction: "It is these mixtures and preparations my father taught me, passed down from generation to generation, that I make. We have added plants and adapted the mixture to make it better from our experience with clients." The second part of the statement shows how the knowledge is not a static list of plants for a mixture, but is in fact placed in a dynamic experience of ongoing experimentation and practice. It is this second form of 'practical' knowledge that Don Juan refers to as passed on from 'generation to generation' and not the actual recipes for mixtures and medicine.

Where Don Juan differs from his father is in his training with SOBOMETRA. He explained to me that he had taken the basic *naturista* course and was developing a mixture to commercialise. He was not staying with SOBOMETRA because they wanted him to give them the recipe of 'his' mixture so they could produce it. By placing himself outside SOBOMETRA Don Juan is able to create a distinct niche for his product based on traditional knowledge from his experience with his father and justified by the biomedical authority of SOBOMETRA.

When I questioned him about the other traders who sell the mixture and if they prepared it correctly he replied: "they do not know, they put in large amounts of this plant or that,

and that makes it toxic”. When comparing the mixtures prepared by those who supply the plants from Cochabamba, *matico* (*Piperaceae* sp.) was dominant and they did not have the *el hecho* / *chuchuwasi*. Don Juan specified *matico* and *cola de caballo* (*Equisetum* sp.) as specific examples of plants that were toxic if taken in excess; that you ‘need to know how much to take’, and that ‘they need to be mixed’, or ‘can make you blind’. He had learnt about toxicity from the courses in SOBOMETRA and used them to justify his authority over the novice who would simply purchase the plants and make the mixture. Don Juan sold the mixture in a bag costing 5 or 10 B\$ (1.0 GBP). It was possible to buy four times as much of the plants for 4B\$, but the *el hecho* was not available at the *feria* directly from suppliers, and cost 5B\$ for a slice from Don Juan or other traders. This provided him with a monopoly on both knowledge and products, used to justify the efficaciousness of the mixture, the price and himself, Don Juan, as an authentic source.



Figure 26. Don Juan and his wife at the annual *Feria del Norte* in Oruro.

At the annual *feria* of Oruro city Don Juan and his wife had a smaller stall on the edge of the market, as they were restricted by the cost of staying in Oruro and transporting a large inventory and had not brought the large stock he displayed in La Paz (figure 26). He was not able to compete with the large stock, or diversity of products the sisters’

stall offered. Their extended kin network based in the community provided the tree bark and other plants which Don Juan did not have.

8.4.4 Variation in knowledge of the Andean herbalist and the itinerant Andean *naturista*

Comparing the stalls and trading strategies of the sisters at the *Feria del Norte* with Don Juan reveals several differences in their explanatory models for healing and knowledge, which influences their products. The sisters had what can only be described as the most successful stall selling mixtures of fresh plants at the annual *feria* in Oruro city in 2005. Unlike the male *naturistas* or Don Juan, they are unqualified, young female, dressed as a middle class city trader *chola*, with *pollera*, skirt, blouse, woollen knitted jumper and hat, stockings and flat shiny shoes. In the city and rural area these credentials are not to a distinct advantage, but in the market place and annual *feria* of Oruro they provide high status. Their extensive social network, practical knowledge of trading and specialist knowledge of preparing medicinal mixtures are represented by their identity and as knowledge so they can carry more weight than the *naturista*. The sisters form part of an extensive network of traders linked through kin and rural community of origin.



Figure 27. The sisters' stall at the annual *Feria del Norte* in Oruro city.

While Don Juan was the authority on plants over his wife, the sisters are the prominent and eminent sources of knowledge on their stalls. Standing behind their tables, they engage directly with the customer, their husbands usually sitting behind them cutting and preparing plant parts. To understand how the sisters are able to claim authority in the *feria* over the urban qualified male *naturistas* and rural indigenous suppliers from local and neighbouring regions, required analysing their interactions with customers and their particular mixtures. The sisters were confident beyond all doubt that their mixture was the best because it was *completo* (full or complete), this single criterion defines their product and knowledge; both the selection of plants and cultural knowledge of the context of ‘complete’ sets them apart. The sales patter they repeated for customers was:

‘¿Para qué quieres? *Matico, suelda que suelda, cola de caballo, chuchuwasi*, para reumatismo, gastritis, pulmón, hígado, riñón, todo *completo*. Mira hay macho y hembra’.

‘What do you want it for? *Matico, suelda que suelda, cola de caballo, chuchuwasi*, for rheumatism, gastritis, lungs, liver, kidney, all complete. Look there is male and female’

The sisters listed the plant names in the mixture, then the illness that could be cured, in the same way Don Juan did. What distinguishes them from the urban and itinerant *naturista* is the use of the terms *completo*, *macho* and *hembra*. For the sisters, the *completo* is not simply a more extensive list of plants but the diversity of plants within the mixture. The sisters added a slice of citrus fruit and bark from lowland tree species, sourced through their extended kin relations and plants which Don Juan did not have access to, at competitive prices. Furthermore, the sisters used the *macho* and *hembra* folk species of *sarzaparilla* roots. The use of *macho* and *hembra* to demonstrate the mixture as *completo* distinguishes the classification from a list of plant folk species to combinations with paired folk varieties of folk species. This classification was not used by Don Juan. The sisters also described some plants as toxic. Their explanatory model used humoral categories of hot and cold to explain how hot plants that were toxic needed to be used with cold plants. This explanation differs from Don Juan and the *naturistas*, who describe the regulation of toxicity as by the quantity of plants and not the use of combinations. Andean use of humoral classification is described in chapter 6.

8.5 Summary

The annual *feria* of Oruro city provides a niche market for medicinal plant mixtures, exploited by specialist market stallholders and *naturistas*. While selling the same products the two groups have distinct explanatory models for the plants' efficaciousness. Both groups use extended trade networks that enable them to combine plants from multiple ecological regions. This enables them to gain a market advantage over suppliers of plants from a single ecological region. The selection and combination of plants for herbal mixtures forms specialist knowledge, and market stallholders and *naturistas* use specialist classifications for the selection of plants in the mixture. Within the marketplace, the sellers take on social identities of the informal trader or urban specialist, which links their specialist knowledge to the products. *Naturistas* use images of the urban medical doctor and biomedical explanatory models of plants' pharmaceutical properties to justify the selection and combination of plants used in the mixture. Andean traders use biomedical explanations for the plants' properties, but Andean explanatory models for the selection and combination of plants.

The use of Andean political and ecological models of redistribution of resources as the basis of verifying mixtures' efficacy enables regulation of supply and monopoly in the marketplace. *Naturistas* reliance on singular classificatory criteria of plant species and their medical properties prevents them from incorporating specialist knowledge of variations in chemical composition across plant species, variation in plants' end effects when combined in mixtures, or ecological knowledge related to supply. The *naturistas'* institutional structure for knowledge validation by central institutions prevents transmission and integration of knowledge related to inter-regional redistribution of the medical resource found in plants and a rapid system of plant species substitution and adaptation to changing market conditions. The Andean herbal specialist stallholders of Oruro incorporate complex sets of knowledge about the market chain, plant varieties, and supply and redistribution by using specialists classification systems and Andean social and political forms to regulate selection and redistribution of natural resources.

Chapter 9

The Urban Marketplace as a Centre for Cultural Transmission

9.1 Introduction

This chapter describes how stallholders in the central marketplace of Oruro city use market unions to define their identity, and use Andean social systems and rituals to regulate the transmission of specialist Andean medicinal plant knowledge. In Bolivia, ethnicity and regional identity have become associated with certain forms of ‘traditional’ and ‘indigenous’ knowledge. In Oruro, different groups use these identities to commoditise the associated knowledge to sell health products. Oruro city’s central marketplace, the *Mercado Fermin Lopez* (Fermin Lopez Market), is renowned as the specialist centre for the production and distribution of the *mesa* mixtures and ingredients used for Andean rituals for the prevention and cure of illness. The Fermin Lopez marketplace distributes the *mesa* to marketplaces and clients across the southern and Central Andes. Established stallholders combine their urban residential status with participation in urban social institutions of Oruro to validate the ‘traditional’ Andean cultural identity of their knowledge and *mesa*. In contrast, stallholders who are recent rural migrants to the city, use their ‘indigenous’ identity drawn from their participation in social institutions of rural communities to authenticate the Andean identity associated with their style of *mesa*. This has created conflict in the niche market for Andean *mesa* cures and challenges to the cultural identity of traditional Andean medicinal plant knowledge.

The first section of this chapter looks at how local environments and social contexts are used to define specialisations and the cultural identity of stallholders. The following sections look at how stallholders of the Fermin Lopez marketplace represent their identity and knowledge through participation in institutional structures and the public events of the civic day parade and annual day of the market celebration. The final section of the chapter looks at how completing Andean ritual *mesa* offerings in different places influences the type of knowledge they represent.

9.2 Regional specialisation and knowledge

The ecology and environment of each market region defines the local adaptation and corresponding medicinal products and knowledge that become associated with the ethnic groups living there. These regional and ethnic identities constructed from forms of localised knowledge, and specific healing techniques are used in the marketplace to commercialise products. The specialist healers of the Andes are referred to as *curanderos* (Spanish) or *yatiri* (Aymara: literally ‘the one who knows’), those who cure illness caused by both natural and unnatural entities. *Curandero* is a general term used in the Andes for non-biomedical healers who use ritualised forms of healing. The *yatiri* and *curanderos* of Bolivia do not use the psychoactive properties of plants to induce altered states of consciousness, or to achieve controlled states of perception to diagnose and cure illness, as reported for *curanderos* of the northern Andes (Joralemon and Sharon 1993), or the people around Lake Titicaca (Schultes and Hofman 1992), who use mescaline in the *San Pedro cactus* (*Tichocerus pachanoi*), or the *Ayahuasca* mixtures reported for tropical Ecuador (Dobkin de Rios 1992) and Amazonian Peru (Schultes and Hofmann 1992).

Andean healers are distinguished from those of these other ethnic groups and medical systems in Bolivia, because of their use of Andean notions of body and illness for diagnosis of natural and unnatural causes of illness. Andean healers specialise or combine an extensive knowledge of the natural pharmacopeia and its uses with ritualised forms of healing using complex mixtures known as *mesa*. In the Andean community, the *yatiri* is given the official authority for performing the rites and ceremonial rituals alongside community authorities, and for performing the role of a general practitioner and household medic. The role of the *yatiri* in communal rituals and health in northern Bolivia has been described by Fernandez (1999). The role and knowledge of the *yatiri* is localised by transmission through apprenticeship and the social institutions of the community in which it takes place.

The four regional groups of Andean specialists in Bolivia are the *Jampiri*, *Kallawaya*, *Yatiri* and *Layca* healers. The *Jampiri* healers of the central valley of Cochabamba combine natural remedies with cleansing and healing rituals (see Alba 1996); the *Kallawaya* healers are from the northern valley of La Paz and their culture, healing traditions, medical plant knowledge and curing *mesa* have been extensively documented by Girault (1987), Oblitas (1992), Bastien (1978a, 1982, 1987 b) and Rösing (1990, 1991, 1992, 1993, 1995); the *Yatiri* and *Layca* healers of the southern plateau specialise in ritual cleansing and healing through symbolic exchange known as *turqaqaña* (see Guerra 1996). Each specialisation is a result of the regional flora and environment, and the social and economic conditions and history of the people. The *mesa* offerings prepared by each group represent their relationship with their environment and health through local resource distribution and the interaction with the external trade and resources of the state by membership to political groups.

The *Kallawaya* communities' territory extends across the compressed vertical environment of the north eastern valley of Bolivia where families have direct access to the diversity of resources from different vertical environments to fulfil their subsistence needs, their medicinal plant pharmacopeia and the inventory for *mesa* rituals. For the *Kallawaya* their understanding of the relationship between health and environment is localised by the diversity of local environmental resources, while their relationships to external institutions and access to secondary resources are negotiated using symbols of their political and cultural identity. The *Kallawaya*'s extensive herbal knowledge and healing techniques are reflected in their lifestyle, through clothes and rituals, that comprise a 'cosmovisión' that has been recognised by the Bolivian government. In 2003 UNESCO proclaimed the *Kallawaya*'s cosmovisión as a 'Masterpiece of the Oral and Intangible Cultural Heritage of Humanity'. The use of territory and history has also enabled the *Kallawaya* to use their ethnic identity and international status to commoditise their medicinal plant knowledge and products through the marketplaces of the northern city of La Paz.

In contrast to the compressed northern environment, the expanded environment of the southern plateau and valley mean that access to subsistence resources requires families to extend kinship and communal ties to regional trade systems located in the highland and valley. In the highland plateau of Oruro, livelihoods combine communal resources

with wage labour in the mines. For the *Yatiri* of Oruro, the ingredients of the ritual *mesa* include representations of local resource distribution within the community, external trade systems, the economic resource of mine labour, and their political and cultural identity with the state for secondary resources. Unlike the Kallawaya, the external trade regions include interregional exchange between vertical environments for their subsistence needs and for their medicinal plant pharmacopeia. In the urban setting of Oruro city, the balance of ingredients and their symbolic representation in the *mesa* is shifted from local subsistence and ecological resources to represent the importance of social networks, commerce and wage labour. The dynamic between rural and urban areas' health needs, has resulted in the unique cultural identities and forms of the rural *k'oa mesa* of Oruro and the *mesa blanca* of Oruro city.

The reduction of representations of traditional medicinal plant knowledge to be the domain of specialist healers, and transmission through communal systems by national and international institutions, has reduced the importance of market stallholders' knowledge and their role in specialist local knowledge transmission to an economic role of supply. However, as I argue throughout this thesis, stallholders do hold an important body of specialist knowledge about the selection, symbolism, use and distribution of natural resources and cultural systems used to regulated resources and health. In Oruro city this knowledge is represented by specific *mesa* mixtures.

9.2.1 Market exchange and specialisation of market stallholders in Oruro

Before the mid-twentieth century the Andean healers collected many of their own plants and the regional groups of healers visited neighbouring regions in an annual migration formed of llama caravans to exchange medicinal products and knowledge (Alba 1996). The southern market region of Oruro is traditionally renowned for the medicinal plant traders known as *mamaquitas* and *tataquitos* from the communities in the eastern cordillera of Azanaques, south of Oruro city, and the *kapachaqueras*, itinerant traders who sell a diverse inventory of medicinal plants and mixtures in the marketplaces of the central Andes. The *mamaquitas* and *tataquitos* trade medicinal plants they collect from the Azanaques mountain region, with those acquired through exchange and extended kin relations of the *ayllu* located in the western Pacific coast, northern ecological regions and with the communities in the lower eastern valley. Traditionally healers and medicinal plant traders from the communities of Oruro used to travel in the annual

llama caravans after the maize harvest to exchange products and services with the *Jampiri* from the communities who formed the lower *ayllu* in the eastern valley of Cochabamba and Sucre (Alba 1996). Exchange of medicinal plants and services through the annual migration have been replaced in the last century by the annual markets held in Oruro, and the marketplaces of Oruro and Cochabamba city, although communities still retain the *ayllu* system of extended kinship to access resources in the lower valleys and other marketplaces of the central Andes.

With the adoption of market exchange and increased access to the city over the last half century, specialist healers rarely travel to source products directly from the different ecological regions to use as medicine, or complete the interregional migrations, but rather purchase from the marketplaces of the city (Bastien 1987b; Rosing 1991). The adoption of the urban marketplace as a centre for exchange of products and knowledge has led to the adoption of Andean social institutions by market stallholders to regulate the trade, knowledge transmission, and forms of local specialised knowledge for ritual *mesa* mixtures in the central marketplaces. With the establishment of marketplaces, the *mamaquitas*, *tataquitos*, and *kapachaqueras* in the eastern cordillera could setup permanent stalls in the centre of Oruro city.

The dominant groups of these rural specialist medicinal plant traders of Oruro come from two communities located in the eastern cordillera: Cahuayo in southern region, and Condo, two kilometres outside the town of Huari. The specialist traders take advantage of their location and extended trade relations through their communities of origin, each with their distinct local products and those from the different regions of the northern and central valley and lowlands, and the Pacific coast. Stallholders from Condo have extended their trade network through kin relations, who have opened market stalls in the La Cancha marketplace of Cochabamba city in the central valley, and by participation in the annual *feria* of Oruro and La Paz. The specialist medicinal plant traders from Cahuayo have an extensive trade network that extends across Bolivia through market stalls in many cities, and through extended kin relations with families in the lowland production zones. The Cahuayo extend communal kinship relations with market stallholders in the cities of Oruro, Potosi and Sucre to the south and La Paz and Tiwanaku in the north. Traders from Cahuayo also use extended kinship ties with merchants located in the lower central valley to access tropical resources. These ties are

extended into Peru through trading trips to the highland markets of Puno in southern Peru, the annual market of Cusco in Highland Peru, and as far as the market in Ayacucho in northern Peru.

The second group of specialist stallholders in Oruro are located in the central Fermin Lopez marketplace and are established residents and citizens of Oruro city and not defined by their membership of ethnic communities. These stallholders have learnt their trade, and stalls have been handed-down, over generations along with how to produce the *misterios* (Spanish; literally ‘mysteries’. Flat biscuits, 4 x 4 cm in size, on which feature images of objects and deities) used in the *mesas* mixtures. The specialist stallholders of Oruro city prepare the rural *mesa* for offerings and cleansing illness, and the *blanca* and *kuti* or *mesa negra* mixtures unique to Oruro city.

The position of Oruro city in the trade network and social position of traders in the central marketplaces has enabled them to access not only products from the local environment but from the international trade routes which run directly to the central marketplaces of the city. Their participation in urban traditions, ritual events and the *fiesta-cargo* systems used to establish groups’ internal hierarchy in the marketplace has enabled their access to and transmission of, cultural knowledge and traditions of Oruro city. The local specialist knowledge of the social and environmental dynamics of the health of the urban populations are represented by the unique form of the *mesa* mixture of Oruro city, and this knowledge is transmitted through the tradition of the *fiesta-cargo* system and rituals performed by stallholders in the marketplace.

9.3 The urban marketplace as a cultural centre

‘Although globalisation is responsible for an increase in the spread of economic diversification of rural Andean communities, local people continue to ground their different identities in a sense of tradition and past,’ (McNeish 2002: 228). These identities are extended to the reputation of people for supplying specific types of medical plant and knowledge of specialised healing techniques. The traditional *mesa* mixtures used in Andean healing and rituals are distributed from the Fermin Lopez marketplace of Oruro city. The hierarchy of stallholders in the marketplace is a result of their ability to locate the *mesa* and its multiple ingredients as meaningful symbols

that relate to people's landscape, history and resources, when used as the ritual offering, or cure for illness. For the traders, knowledge of local stories, myths and symbolic figures used in the *mesas* provide what Bourdieu (1973) refers to as 'cultural capital', reflected in the economic value of *mesas* sold. However, the *mesas* have different uses in different contexts and these in turn require different interpretations of the uses by different groups or places where they are performed.

The ability to access resources to sell and permits to trade in Oruro city are dependent on people's participation in different social institutions. Rural communities control production and supply routes, while urban institutions regulate access to market space and stalls and definitions of products. The 'traditional' medicinal plant mixtures, or *mesa*, characteristic of Oruro city, are the result of access to both products from rural areas, imported goods and cultural knowledge from participation in ritual performances. Medicinal plant traders in Oruro city use membership of market unions to differentiate themselves and their knowledge and products as 'traditional' ritual *mesa*, distinct from 'natural' or 'home' remedies' and state-regulated natural medicinal plants. In Oruro's central marketplaces, the established medicinal plant stallholders' 'traditional' knowledge of the city is represented and transmitted through *fiesta* sponsorship and through rituals performed at various sites in the city. Recent migrants to the city are challenging this 'traditional' knowledge and the niche market for *mesa*, using membership of unions to gain access to market space, while using social mechanisms and knowledge located in rural communities of origin for transmission of knowledge through rituals performed in the rural communities.

The medicinal plant market and street trading in Oruro is 'informal' in that it is not directly regulated by the government for tax purposes, although the location of market pitches, opening times and rent are regulated. The relationship between the informal sector of marketplace traders and the state is mediated through membership of the collective organisation of market unions, but the hierarchy within marketplaces is mediated through participation in a rotary system of *cargos* and sponsorship of festive events for each market sector. Daily, weekly and annual markets have separate unions who are under the umbrella of regional and national unions. The unions mediate between the individual, the market sector and the state. The unions are highly organised and interact with other market unions, residents associations, *Junta de Vecinos* (the

neighbourhood council) and the municipal authority. The market unions organise permanent and periodic market trade, defining the space, days of weekly *feria* and dates of annual markets and the distribution of goods and sections of traders within the marketplace. The market trader unions are also affiliated to the COB (Central Obrera Boliviana) at a regional and national level, and interact with departmental and state government.¹

Medicinal plants and semi-processed medicinal plant products or mixtures sold in marketplaces by ‘informal’ traders are free from state taxes or regulations that are used for commercial pharmaceutical medicines and natural products. Packaged or semi-processed products sold in pharmacies or shops as natural products fall under state regulation and require licences and certification. Producers of products sold outside the informal market sector require certificates for the plant medicinal properties, certification of sanitation for the location of manufacture, packaging and registration of the products. The person responsible needs to be affiliated and certified as a member of SOBOMETRA who has completed the designated SOBOMETRA training courses. In contrast to state regulation, the informal market stallholders have complex social systems that define the hierarchy of traders within marketplaces. A ritual system and *cargos* similar to that of Andean communities are used to regulate the trade of products, selection of plant species in mixtures and transmission of knowledge. Medicinal plant stallholders in Oruro form two groups: 1) those in established marketplaces, with knowledge of the city’s history, rituals and traditions and who are linked to ritual obligations and social groups in the city, and 2) the more recent migrants who have established street markets and bought stalls in enclosed markets, and whose knowledge is rooted in traditions of the rural communities they have land in and retain ritual obligations to access trade. The mixtures used as offerings and healings known as *mesas* represent traditional Andean cultural identity and have high value as a commodity for the identity of Oruro city itself and its national recognition as the folkloric capital of Oruro. Conflict between these two groups over identity and between these groups and the state regulation for traditional healers and alternative natural practitioners provides a basis to observe variations in the structure and forms of medical plant knowledge and their transmission.

¹ For a description of relations between market traders and the state in the Bolivian city of El Alto see Lazar (2004).

9.3.1 The central marketplace of Oruro city: *Mercado Fermin Lopez*

Market stalls and market trade in Oruro city are highly regulated and sellers require a permit or license from the municipal authority, membership of market unions and to fulfil social obligations by participating in the events and social institutions of the marketplace and market sector they belong to. Informal market trade in urban areas are represented by three umbrella market unions: 1) internal enclosed permanent daily markets, 2) open exterior *feria* which are held in weekly rotation at different marketplaces of the city, and 3) the ambulant street traders. Each group developed alongside their political representation, the formation of unions making it possible to negotiate market licences for pitches with the local neighbourhood council and the municipal authorities.

Trading in the marketplace is dependant on the development of a successful network of social relations with other stallholders to access resources and share cultural experiences and knowledge through performing rituals. Access to these experiences and knowledge is obtained through completing socially-defined exchanges of services, *akullicar* (chewing coca leaves), and supporting families in times of need. Such networks are only available through spending time in the marketplace and investing in other stallholders to build 'social' and 'ritual' capital. The stallholder's products' value is rated by their reputation and past experience, and is enhanced if they fulfil both financial and social obligations in the form of performing annual rites and offerings, representing the market section in the union and inviting others and sharing benefits through celebrations including drinks and trade. The support of other stallholders can lead to invitations to private rituals and in turn provide the private knowledge of localised symbolic significance for the *mesa*.

As the oldest and most central marketplace in Oruro city, the Fermin Lopez market is also an important part of the history and identity of Oruro city. The market was established in the 1920s as the first purpose-built enclosed market, and later refurbished in the 1940s (see figure 28 and 29 on pg. 279 and 280). It is located in the commercial zone of the city and supplies the central zone and its affluent residents with first grade

products selected from the outer supply centres and marketplaces of Oruro. The road and zone around the market form the central commercial district of the city with wholesale stores and distributors of imported goods, notably consumer electric goods, and the wholesale outlet for coca leaf brought from La Paz.

The section of the marketplace referred to as ‘home remedies’, is the centre for the distribution and wholesale supply of the Andean healing *mesa* and its ingredients to the central and southern Andes. The market sectors’ stallholders distribute the *mesa* and its key ingredients to retailers of all the major marketplaces in Oruro city, the rural markets held across the department of Oruro, the marketplaces of the Bolivian cities of Cochabamba, Potosi, Sucre and La Paz, and to the marketplaces of Argentina in the south, notably those of Buenos Aires. As the centre for distribution, the Fermin Lopez market stallholders who prepare the *mesa* play a pivotal role in the reproduction of Andean cultural identity of traditional medicine represented by the *mesas*. The regulation and transmission of the knowledge and identity of Andean medicine represented by the *mesa* is regulated through institutional structures of the marketplace.

The stallholders’ monopoly on distribution for authentic *mesas*, which fulfil the requirements of the Andean cultural concept described by stallholders in Oruro as *completo* (complete), need to have all the correct ingredients, and the authentic suppliers of the white *misterio* biscuits used for the *mesas*, is not simply a result of Oruro’s central geographic position on the regional trade network. Their monopoly on supply and their reputation as the centre of authentic *mesa* and in turn Andean traditional medicine and cultural identity, results from their ability to maintain a distinct body of knowledge about the interrelation of social, economic and environmental aspects represented through the ingredients used in the *mesa* and the stories that relate the historic experience of life, and Andean concepts of wellbeing specific to Oruro. In Oruro city, the cultural identity of marketplaces and stallholders are constructed through their role in local history, their geographic location and the products sold. Stallholders of the home remedies and *mesa* section extend this cultural identity of the oldest and central marketplace with the highest quality of goods to themselves and their specialisations, to define themselves against other more recent marketplaces, specialist healers and the specialist medicinal plant knowledge of rural communities.

The Fermin Lopez marketplace occupies the central courtyard extending 100 square metres across a single city block, which it shares with the church of Santo Domingo. The central courtyard is enclosed by a two storey high wall that accommodates outlets and shops facing surrounding streets. The marketplace is accessed by three main entrances, each a wide arch, five metres high and hung with elaborately decorated wrought iron gates. The northern and southern entrances lead directly to the main courtyard while the western entrance opens into a food hall with rows of benches and tables where *api*, the local speciality, a hot maize drink, is served with deep fried pastry sprinkled with icing sugar.



Figure 28. Main entrance to Fermin Lopez marketplace.



Figure 29. Western perimeter of Fermin Lopez marketplace.

Inside the central courtyard the market stalls, each a three-metre square corrugated iron kiosk, are arranged in rows. The Fermin Lopez is the only marketplace to have shops of brick construction within the marketplace; located along the west wall. Four shops and the central row of stalls that lead from them are known as the *Sección Remedios Caseros* (home remedies section), and sell the unique *mesa* mixtures of Oruro city used for Andean offerings and healing rituals. The *mesa* and their ingredients are sold from twenty-five stalls and the four shops. Five of the stallholders have held the stalls for several generations, some first supplying from shops then moving into the metal kiosks that were installed in the 1980s. The other twenty stallholders are first or second generation migrants from the towns of Condo, La Joya and Cahuayo, in the eastern cordillera south of Oruro, who purchased the kiosks during the 1980s. Traditionally established urban stallholders produce and distribute the *misterio* used in the *mesa blanca*, while more recently established traders from rural areas use their extended kin network and community ties to supply the flora used in the *mesa*.

9.3.2 Parades, and conflict between residents and migrants in the medicinal plant trade

In Bolivia, market unions enable stallholders to gain political representation and social identity. In Oruro, public and private institutions participate in annual parades that celebrate the historic events of the republic, department and city. The parades are a public display and a statement of each group's political identity, affiliation to the city, and their status in relation to the political structure of the department and the state. Each parade is a public holiday, and marketplaces, shops and offices are closed. Parades begin around ten in the morning and last well into the afternoon and include bands and displays, for which the public take up positions along the route to watch. The parades set off from the north of Oruro city and march some three kilometres across Oruro city to the city's central plaza. While the objective of these dates is to pay homage to the foundation of Bolivia and Oruro, the political bodies of the department, private institutions and trade unions use the events to represent their political and economic identity and social status. For the medicinal plant stallholders, the events provide an opportunity to reaffirm their status as independent, private, commercial yet Andean and Orurenean market stallholders and their independence from 'indigenous' rural communities and state institutions that regulate natural health, medicine and pharmaceuticals. For the stallholders, the parades also act as a represent their identity through their antiquity as an established and recognised organisation.

The principal parades that the market stallholders of Oruro participate in are referred to and named by the day of the historic event they celebrate: 1) *Diez de Febrero* (10th of February), to mark the anniversary of the first proclamation of the revolution against Spanish Colonial rule in South America, which was made in Oruro; 2) *El primero de Noviembre* (1st of November) held on the anniversary of the foundation of Oruro by the Spanish crown and; 3) *El 6 de Agosto* (6th of August), a national parade held in cities across the country to mark the date of independence from Spanish colonial rule. Market stall owners and traders also participate in 4) the *Primero de Mayo* (First of May) parade, alongside the other trade unions and guilds of Oruro. The first of May parade is

solely for the trade unions and guilds to mark workers' rights, through remembrance of the anniversary of those who fell in the Chicago marches for the eight hour working day in 1886. The order of groups in the parades is representative of their position in the socio-political structure of the city. The parades are led by the elected authorities of Oruro. The 10th February parade is often led by the President of Bolivia through the city to the central plaza. The departmental authorities proceed to take up positions on the balcony of the municipal building overlooking the plaza to oversee the parade. Each group marks their allegiance to Oruro as they parade past the balcony.

The political authorities are followed by the army regiments and battalions stationed in Oruro, then the public and municipal workers including representation from the police, health services, administrative offices and schools. These are followed by private and commercial groups of businesses, professions and shop owners, then the mine worker union, and the market unions. The final groups of the parade represent the *Juntas de Vecinos* (political representation of residential zones in the city) and the representatives of rural communities, who finish the parade. In 2007, the promotion of 'indigenous' or *originarios* (original) ethnic communities instigated by the 'indigenous' president Evo Morales, led to the repositioning of the rural communities before the trade unions in the parade. This in turn has been reflected in the valuation and forms of knowledge held by the different groups. The medicinal plant stallholders specialist traditional knowledge of inter regional distribution and urban health, formed by the market centre, is being challenged by the 'indigenous' knowledge of rural communities who are located on the periphery of market networks and have localised specialist knowledge.

Within the market union part of the parades, the order of marketplaces, and the individual sectors in the marketplace, are defined by the date of establishment: the oldest marketplace comes first and is led by the oldest sectors within that marketplace. As the first enclosed purpose-built market to open in Oruro city and the central marketplace of Oruro, the Fermin Lopez market syndicate is in the first block of market unions of interior markets that pass in the parades. Within the block of stallholders from the Fermin Lopez market, the home remedies section is one of the oldest sections within the marketplace and the fourth group. They are followed by the more recently established sections in the market, those for imported electrical goods and assorted general items. Within the home remedies sector the stallholders differentiate their

identity further by their dress code. The older stallholders who have, or have had, shops within the marketplace, wear trousers or a formal skirt and a jacket denoting their social status as ‘shopkeepers’, while the more recently established group of traders use the dress of middle to upper class *chola* with the distinctive mini-bowler hat, shawl and multilayered *pollera* skirt. The exterior markets and *ferias* come after the interior markets sections.

The exterior Junin Street market union of home remedies’ is officially affiliated as an annex section to the interior Campero market, but they form part of the second block of traders of the exterior markets which comes after all interior markets and towards the end of the market traders unions (figure 30 A and B). Established in the 1980s, the Junin street marketplace syndicate style is of middle to lower class *chola*, reflecting a lower social position in the city. Within the parade other suppliers of medicinal products are represented by private business and the pharmacies, or the specialists healers the *naturistas* and Andean healers, who all come before the market unions and towards the front of the parade.



A



B

Figure 30. A. Stallholders from the Junin street market section parading in front of the municipal office. B. Standard for the Junin street market section. ‘Association of minor Comercialists, Junin Street and joining roads, 12-X-87, Oruro, Bolivia’. Background colour: red, yellow and green of the national flag and the central emblem is that of Oruro.

Each year traders offer, or are elected, to take on the positions within the union market section. The Fermin Lopez market interior syndicate positions were general secretary,

two standard bearers, financier, secretary of relations between stall holders and the market authorities, secretary of hacienda (administration of funds), secretary of conflicts, secretary of benefits (for the sick), secretary of public relations, their 'vocal' who attends regional federation meetings, the secretary of official acts and the director. One of the older stallholders in the marketplace commented on how she organised outings and distributed gifts to members on Mothers' Day when she was in the syndicate and the recent migrants did not organise these social events of city people. This marked the difference between the urban traditions of the established traders and recent migrants as two separate sets of folk tradition: one located in rural communities and their festivities and customs, the other of the urban community based on unions through a common trade in the city and participation in urban traditions and customs. For the medical plant traders the union is an important social institution defining them against the state, but they also need to act as independent traders within this institution.

9.3.3 Knowledge transmission and the *fiesta-cargo* system

In rural communities the *fiesta-cargo* system acts as an important social mechanism for the transmission of cultural knowledge, it also creates a hierarchy of authority within the community defined by cultural knowledge through experience. Through the participation and fulfilment of roles in a tiered system known as the *thaki* system of *cargos*, individuals gain knowledge from the responsibilities and corresponding ritual events (Rist 2002). The *fiesta-cargo* system also enables Andean communities to define their cultural and political identity within local, national and global contexts (Abercrombie 1998). The basis for cultural transmission within this system is through participation and performance of the Andean rituals. The ability of a community member to prepare and carry the *fiesta* or take on a specific role in the rituals requires their preparation and induction through participation in previous rituals. Taking on responsibility of *cargos* requires individuals to establish extensive social networks to cover the economic cost of providing the resources for the ritual. This process enables individuals to learn traditional values and in turn creates authority within the community to negotiate with external agencies of the state.

El presterio is a social institution in Bolivia in which couples, named the *prestes* or *pasantes*, are elected from a community or group and given the social and economic responsibility of organising and celebrating, or 'passing', a religious festival for one

year. The *pasante* are responsible for financing the costs of the festivities for their year in office. Although originating in rural communities, the *pasante* system is also used by groups affiliated through their workers or traders, including sectors within marketplaces. The *fiesta-cargo* system is also used by groups of traders in the marketplaces of Oruro. Stallholders of Oruro city's central Fermin Lopez marketplace defined their status in the marketplace by relating the years they took on the cargo of the sponsor for the annual 'Day of the Market', and their roles within the market union. They also use the antiquity of the medicinal plants sector and the market's patron saint 'El Señor de la Paciencia' (The Lord of patience) as part of their tradition to validate their authenticity over smaller more recently established marketplaces with fewer years of passing the *fiesta*.

The annual *fiesta* begins with a *velada* (vigil), held in the affiliated church, and a supper in honour of the image of the patron saint held on the day before the *fiesta*. After the mass an image of the patron saint owned by the market sector is left in the corresponding church overnight. On the day of the *fiesta*, the different market sectors attend morning mass and blessing before parading through the city from the church to their organisation's headquarters, with dancers, *cargamento* (solid gold and silver objects symbolic of status), led by the *pasante* carrying the image of a small replica figure of the patron in a glass case. The wealthier groups' *pasante* are expected to hire bands and dance troupes; each year new clothes are ordered and suits made for the men and dresses or uniforms for the women. Each marketplace and each sector within the marketplace has a patron saint who is celebrated each year on the 'Day of the market'.

9.3.4 'Day of the Market': *fiestas*, internal hierarchy and knowledge transmission

In Oruro marketplace stallholders take part in a number of traditional rituals and *fiestas* to secure the identity and status of the marketplace, their section in the marketplace, and their identity and status as individuals. The rituals play the dual role of transmission of cultural knowledge of 'ritual rules' and preparations of mixtures, which underpin the fundamental knowledge for the selection and combination of plants in medicinal mixtures. The two most important annual rituals for market stallholders in Oruro are the 'Day of the Market' held on November the 10th, and 'Tuesday of *Ch'alla*' held in Easter, on the Tuesday after carnival. On the Day of the Market traders show their

devotion to the patron saint of the markets and the patron saint of their particular market sector. The festivity, music, bands, dance troupes, drinks and food are all paid for by the annual *pasante* sponsor, a position which is held for a year and rotated between members of each market section. The success of sales and the status of each market sector are reflected in the opulence of the *fiesta*, as is the status and prestige of the stallholder who is the annual festival sponsor. An annual sponsorship in Oruro can run into the equivalent of thousands of pounds, taking years to prepare and requiring complex social networks of family, community and clients. Market stallholders who have been *pasantes* have begun to recoup some of the costs of the *fiesta* with the sale of alcohol at the *fiesta*.

From my participation in three annual *fiestas* for the ‘Day of the Market’ in Fermin Lopez marketplace, I found that for the stallholders, the *fiesta* is a mark of their past year and the success of the coming years. A poor *fiesta* and poor sales would be reflected in the sponsor not performing a good *fiesta*, although it is the will to perform the *fiesta* correctly and with devotion that carries higher values than the economic outlay alone. A poor *fiesta* that was carried out with devotion and attention to detail in performing the elaborate rituals over several days, with the correct food, drinks and libations, will convey higher status for the *pasante* than an opulent *fiesta* with poor *fiesta* etiquette. This status is not represented in economic terms but as ‘ritual capital’, which is gained through personal experience and a social network that supports and instructs members on the correct order, etiquette and formalities of the occasion formed by following formalities of Andean social institutions through exchanges of material goods and clients with other stallholders. The specific ‘ritual rules’ (Buechler 1970) for the *fiesta* depend on the history of each marketplace and its traders. The ritual system in the marketplace has the same structure and role to transmit ‘ritual’ knowledge as those found in rural communities (see Rist 2002 for a full description of the cargo system and preparation in the performance of rituals for the Aymara community of Mujillu located outside Oruro). This demonstrates a social structure in the marketplace that follows those of rural communities for cultural transmission of ‘ritual knowledge’ and internal hierarchy through accumulation of ‘ritual capital’.

In the Fermin Lopez marketplace, the performance of the ‘Day of the Market’ marked the cultural differences in the home remedies section between the longstanding

stallholders and more recent migrants from the rural area. The longstanding stallholders, whose experience dated back generations in the marketplace, constantly noted how the new *pasante* had cut costs by not serving a bottle of champagne to each stallholder, but had used individual glasses served by waiters, and that they only wanted to get drunk. They also noted that the band had not been contracted for the entire *fiesta* and that a DJ had been used. The newer traders considered the DJ and sound system to be a sign of modernity and status from their perspective, based on *fiestas* held in rural communities where a DJ held high status. The stallholders also noted how the standard had been carried, how the image of the sector's patron saint had been dressed, if the cloth had been of an appropriate colour, and the choice of clothing used by the *pasante* for the occasion. In the same way, if it is a trader's first time as a *pasante* and they have little experience and have not fulfilled many other *cargos*, their dedication and devotion can be used to balance the lack of knowledge of ritual rules. Their success is in turn a result of the ability of the market sector as a whole to instruct them in the correct manners and forms. In this context, the market *fiesta* forms a complex social system enforcing 'ritual rules' and their transmission.

In the Fermin Lopez marketplace, the Day of the Market follows the same structure and system as the *pasante* system in rural communities, forming a community and social institution within the city. The day before the *fiesta* a vigil is held for the patron saint, and for each sector small replicas of the original image are carried in a glass-fronted box and are left with the market sector's standard in the Church. The traders participate in evening *convivencia* (to share) where they eat, drink and chew coca leaves together, as well as dance to bands provided by the annual *pasante*. The following day of the *fiesta*, the market stalls are adorned with flowers and paper decorations and the traders attend the morning service. The *pasante* prepares for the service in the weeks prior to the *fiesta* with the priest, and in the service sits at the front of the church and receives the priest's blessing. The *fiesta* of the market is of particular importance to the Fermin Lopez as it was the first and central marketplace in Oruro and is constructed in the same block as the Church. The figure of *El Señor de la Paciencia* is both the patron of the church and of the marketplace. Following the service, the figure of *El Señor de la Paciencia* from the church is carried around the market stalls on the shoulders of four men preceded by the priest, who blesses each stall by splashing them with holy water (figure 31). The status and importance of the Fermin Lopez as the central marketplace

is reinforced through the parading of the church's figure and the blessing of the stalls by the priest. Other marketplaces have only a small figure in each market sector.²



Figure 31. Figure of *El Señor de la Paciencia* being carried through the Fermin Lopez marketplace: 'Day of the Market' 2006.

After the priest's blessing of stalls, the stallholders pass one-by-one, following an invitation from the *pasante*, to blow the smoke of incense from a hand-held charcoal burner over the market sector figure of the *Señor de la Paciencia*. The act demonstrates respect, and offers thanks for the protection of the sector, which unites the stallholders. Following the rituals, the *pasante* provides the food and drinks for the traders and their guests, and then hands over to the newly-elected *pasante* for the coming year, and

² Of note is the acceptance between the church and traders of their pluralistic beliefs, with the Catholic blessing of the stalls that sell the Andean offerings for Pachamama (mother earth), *el Tío* Andean deity or Christian devil and the patron saint of the miners as well as off-cuts and un-consecrated Ostia (Mass wafers) to cure fright. The priest was accepted by the stallholders for his knowledge of the rituals and joining in the *convivencia*, sharing a drink with the stallholders on the eve of the *fiesta*. His acceptance of the tradition of chewing coca as a communal ritual, and of offering thanks to the earth in the church, were also in his favour. Whilst he did not participate, there was a mutual respect between the stallholders and priest for the communal use of the church and different cultural beliefs.

candidates for *pasante* for the year in advance are proposed. The day of the market is also an opportunity for traders to invite their immediate family members, the most important customers and suppliers, notably specialist Andean healers and traders from other marketplaces, who come to participate in a communal drink and *pijchar* (chew coca leaves) after the main event. This enables traders to extend their status and social ties within the wider market network.

In contrast to the established Fermin Lopez market, the Junin Street market does not have a patron saint. The stallholders of the Junin street market celebrated the Day of the Market, but as a new marketplace, only established in the last twenty years, the stallholders had not taken on a figure or patron saint for the market sector. The stallholders explained that this was because of the high cost associated with performing the *fiesta*. This enabled them to regulate the market's political structure through the market union and the cultural 'ritual rules' through external institutions of the communities they came from. This was possible because the Junin street market union was formed of a majority of stallholders from the communities of Condo and Cahuayo, which enabled them to control decisions about their market sector. If a *fiesta* cargo system and annual *pasante* was established around a patron saint, the traders from Condo and Cahuayo would have been at an economic disadvantage to more prosperous stallholders in their marketplace. This means that for the Junin street market the internal hierarchy of the stallholders is regulated through 'ritual capital' accumulated through the completion of cargos, and 'ritual rules' that are learnt or transmitted and defined by the external institutions located in rural communities. This is the opposite to the Fermin Lopez market whose 'ritual capital' and 'ritual rules' were a result of completion of cargos including the Day of the Market *fiesta*, which were defined by social institutions within the city. The more recent stallholders to join the medicinal plants section in the Fermin Lopez market, although at an economic advantage from their accumulated capital, did not have the 'ritual capital' to regulate and define the internal hierarchy of the market sector and the form of ritual knowledge of urban ritual institutions.

Unlike the Day of the Market, the annual ritual performed on the 'Tuesday of *Ch'alla*', the Tuesday after the annual carnival, is an individual event for stallholders. The tradition consists of traders performing the ritual offering of burning a *k'oa mesa* at

their kiosk or stall, giving thanks for their year's trade and asking for protection and good luck in the coming year. In the Fermin Lopez market, the ritual was carried out at each stall at different times during the day with most performed in the morning.

Traders formed groups of two or three kiosks, with the main trader and one or two immediate family members who helped in wafting the smoke from the *sahumerio* over the stall. The offering was prepared by each stallholder and their family in private, and the stories and explanations for the inclusion and position of each item in the mixture remained within the family. The burning of the offering was celebrated with the neighbouring stallholder who they were friends with and shared in the *pijchar* exchange of coca leaves to chew. The general consensus of white smoke from the offering and sweet taste of the coca leaves made by stallholders were considered symbols that the ritual had been a success. Stallholders also perform individual rituals at their stalls during the year if they felt their trade was particularly bad or they had been the victims of envy that caused poor sales. The ritual would be performed by a specialist, and acts as a visual symbol to the other stallholders. Balance with the different entities of the Andean world is represented through the performance of the ritual. A stallholder with poor sales or bad luck with a poor quality supply of stock is believed to be associated with not giving thanks, and not performing the ritual correctly to the appropriate deity. This creates a complex cultural system where giving good offerings correctly regulates the system of supply and consumption, with a degree of social enforcement for correct preparation of mixtures and conforming to norms of ritual practice.

Outside the marketplace, stallholders perform rituals at ritual sites around the city or in their community of origin. Stallholders from the Fermin Lopez market who had lived in the city for several generations performed rituals at the traditional site of the Condor in southern Oruro. The ritual was performed annually in November by two stallholders and attended by the immediate family members and assistants of the stalls. Each stallholder prepared an offering for their stall and celebrated with the traditional *ch'alla* libations of alcohol and *pijchar* of coca leaves. These personal forms of offering were opportunities to reflect on sales, relations in the marketplace and with suppliers and clients, and share stories of significance and meaning of the different ingredients used in the offering. The offering of a *mesa blanca* was very elaborate and not customarily seen in the marketplace, the private ritual was an opportunity for the specialist

stallholder to complete the traditional offering used at the ritual site in Oruro city and share this within the immediate family.

9.4 The urban marketplace and local specialist knowledge of Andean *mesa* cures

By comparing the different meanings and forms of Andean *mesa* mixtures that are prepared by specialist medicinal plant stallholders in Oruro city's central marketplace, it is possible to understand how they are linked to, and represent, traditional, indigenous and local knowledge. *Mesas* are used as cures and offerings to maintain the balance between individuals, groups and deities who represent the natural environment. In Oruro, *mesas* are performed by rural communities for annual ceremonial events, and by trade unions, notably the mine shaft work parties, professions and market trade unions for annual offerings. Stallholders needed to be able to advise and select the correct *mesa* and ingredients, which requires the diagnosis, or requirements, of clients to relate their specific social, economic, and geographic reality with the symbolic significance given to each ingredient.

Mesas are a complex mixture of ingredients sourced from across the Andean region that are central to Andean forms of curing and maintenance of wellbeing. The *mesa* itself can be a single *plato* (plate), or formed of many *platos*. The Kallawaya healers of Northern Bolivia describe *mesa* as 'an offering that is prepared on the ground and is part of all cures and healing' (Rosing 1995: 34). Fernandez (1995) recorded eight types of *mesa* prepared by Aymara specialists in urban and rural areas of northern Bolivia, which form two use categories: 1) *mesa* used to regulate the relation with the agricultural productive cycle in rural areas, or monetary income in urban areas, family and social order, and health; and 2) *mesa* specifically for cures related to soul loss and attacks by bad spirits or 'witchcraft'. Fernandez notes that the diagnosis of the problem or affliction presented by a patient defines the specific *mesa* and specific ingredients used in each *mesa* or combinations of plates in a *mesa* cure. A patient may often require a *mesa blanca* (*mesa* for health) to affect the family order, and then a *mesa negra* (*mesa* to free the soul) to release the *alma* (Spanish soul) or *ajayu* (Aymara soul) from the bad spirits that hold it.

In a study of urban ritual *mesas* in Oruro, Armstrong (1989) describes the ritual form of *mesa* used to communicate with the environment as *despacho*: an offering used to propitiate principal earth deities and increase *suerte* (Spanish literally: luck) which is viewed not only in terms of material fortune, but also personal well-being and harmony with the cosmos by acknowledgment of the active forces which influence the immediate physical environment (Armstrong 1989: 6). Armstrong found the content and arrangement of *mesa* to constitute a ‘symbolic language’ used for the transition from *mala suerte* (bad luck) to *suerte* and the healing *mesa* to bring changes between states and access to *suerte*. The *mesa* ritual enables Andeans to define their social, economic and personal health in symbolic terms; in Oruro this activity is centred around *Pachamama* (Quechua: mother earth), and *Tío* the guardian spirit of the under world and mines. The three most important *mesa* offerings used for *suerte* are *Mesa para Pachamama*, *Mesa Blanca* and *Gloria mesa*. A *mesa* needs to be *completo* (complete), to have the correct combination, quantity and colours of ingredients that are balanced (Armstrong 1989: 67). The ability to make a *mesa* complete requires cultural knowledge specific to Andean forms of healing and symbolic representation, which relate to the specific environment and place the *mesa* is performed in and for. Stallholders in Oruro city’s central marketplace prepared between four and twelve different types of *mesa*. Stallholders altered the ingredients and recognised variation in the significance and use of *mesa* for rural and urban areas and for different specialist healers from different regions.

All stallholders prepared *mesa para Pachamama* (*mesa* for mother earth), offered to bring clients to a shop, for a successful business, for work, and for money in urban areas, and the rural variation referred to as *k’oa mesa* used as an offering for agricultural production and to protect the home in rural areas (see figure 32 & 33 below). Specialist stallholders prepared the *mesa dulce*, *gloria mesa*, *mesa blanca*, and *mesa especial*, all used as offerings for thanks and protection. Stallholders also prepared *mesa de almas* for Monday and for the Day of the Dead, and were aware of a number of other *mesas*, including *tranca mesa* used to stop people achieving an objective in business or life. Stallholders recognised the need for variation of the ingredients, form of preparation and symbolic meaning of the *mesa* when they were used in rural or urban areas, and by specialist healers from northern and southern Andes, as recorded for *mesa* in northern Bolivia by Fernandez (1995). Stallholders also gave advice on how to perform *mesa*

offerings to families or individuals, and described how *mesa* should be prepared and where to purchase accompaniments including coca leaf and alcohol. The *mesa negra* and *kuti mesa* were prepared as cures relating to illness where the soul was debilitated or lost. Stallholders advised clients when and how the *mesa negra* or *kuti* cure needed to be performed and on which of the four forms of use: 1) burial; 2) burning; 3) washing with water that the *mesa* mixture was boiled in; and 4) drinking the water the mixture was boiled in. More severe cases were referred to a specialist Andean healer who could diagnose and perform the healing. Such healings could include the use of multiple sets of *mesa negra*.

The most important *mesa* in the Andean calendar is the *mesa* of August. In rural areas the *mesa* of August is performed before the planting of crops and marks the new agricultural cycle. In urban areas the August *mesa* marks the commercial and business success of the past year and an offering for continued success for the coming year. Urban *mesas* are strictly regulated by the calendar, Tuesday and Friday are for *mesa negra*, Thursday and Saturday for *Gloria mesa*, Monday and Wednesday for *Pachamama* and *k'oa mesa*, and Monday for *mesa de almas*. While the August offerings to *Pachamama* can be made by individuals, more specific *mesa* used for individual cures or offerings by a family or group in times of social changes or communal work require an Andean specialist *yatiri* or *curandero*.

Each *mesa* and their ingredients have a symbolic significance that enables Andean people to relate their health and wellbeing to their environment and their social and economic reality. Rösing (1994, 1995, 1996) highlights the importance of the position of each ingredient in the *mesa* in relation to other objects in the *mesa* and their geographic, ecological, social and economic relation and significance to the patient, and those who participate in the curing ritual through the orations of the healer. Market stallholders needed to know these culturally embedded Andean meanings to be able to discuss and prepare *mesa* for their clients.



Figure 32. Specialist Andean medicine stallholder with *mesa blanca*, Fermin Lopez marketplace.



Figure 33. Specialist Andean medicine stallholder preparing *k'oa mesa* in Fermin Lopez market.

In the marketplace, the retailers of prepared *mesa* and the specialist stallholders who prepared *mesa*, were differentiated by their knowledge of the variations of *mesa*, and ability to describe the symbolic meanings of why each ingredient was selected and where it was located in the *mesa*. This knowledge gave the specialist stallholders economic leverage over retailers and enabled them to attend to specialist Andean healers and prepare *mesa* offerings for larger communal groups. Whilst a complete analysis of all the ingredients used in the *mesa*, their geographic origins and symbolic meanings is beyond the scope of this thesis, it is important to highlight the complexity of the knowledge and its specific localised form, in order to analyse how knowledge is transmitted through practice, and to demonstrate that the *mesa* are not simply a list of ingredients. A full description of *mesa*, their ingredients in Oruro city, and a discussion on their symbolism can be found in Armstrong (1989). The two *mesa* most commonly prepared in the Fermin Lopez market are the *mesa blanca* offering for *suerte* and the *mesas negra* to cure disease.



Figure 34. Small urban *mesa blanca*.

The small urban *mesa blanca* (figures 34) is prepared on a sheet of graph paper 20 by 20 cm which had been used for a college exam. On this the base a nest of white or coloured wool is formed, over this leaves of *k'oa* (resinous Andean bush) then granules

of *untu* (llama fat) are placed. Urban *mesa blanca* of Oruro use only a single small branch of *kille k'oa*. Coca leaves are placed anticlockwise followed by the white or coloured *dulce* (sugary sweets). The *dulce* are manufactured exclusively for use in the mesa and are located in the different sectors of the mesa depending on whom the offering is to be made to. Gold and silver leaf are placed along with the *chiwchi mesa*, a package prepared by specialists in La Paz, containing *wyruru* male and female seeds, other seeds from the lowland tropics and twelve or more lead figures each one centimetre high. Two or three different types of pasta and several nutritional beans, pulses and seeds, including barley and broad bean, along with biscuits and condiments, including cinnamon bark and rosemary, are placed on the mesa to represent a complete meal for the spirits. *Misterio* are placed in the appropriate sections of the mesa. The number, shape and image of the *misterio* is appropriate to each mesa offering and its use. Finally the eight centimetre or larger, *misterio* figure and lead figurine appropriate to the petition of the client are placed on the top and silver topping sprinkled over the entire mesa.

The *misterio* are produced by specialist market stallholders who have their own personal moulds they use to manufacture the thousands of *misterio* sold in Oruro. Stallholders guard their recipes and designs jealously and create new designs that represent current trends. Knowledge of how to make *misterio* was passed on through families. I recorded over forty different *misterio* images, each with different symbols and significance, with just one stallholder. The *misterio* produced in Oruro are unique and specific to the mines; they depict the *Virgen del Socavon* (Virgin of the Mine Shaft) and other deities of Oruro who protect miners, and relate the deities and symbols of mining to the interaction of exploitation of natural resources with the exploitation of welfare and health of the miners. The *mesa blanca* plays an important role for the mining industry, and is the most lucrative sector of the medical plant market in Oruro.

The action of performing the ritual offerings unites mine workers from different ethnic communities with a common identity as workers, able to define themselves in political and economic terms (Nash 1979). The *mesa blanca* is the principal and most important mesa used by miners and without the annual mesa being offered to the *Tío*, the guardian of all that is below earth, miners felt they were not protected and would succumb to ill health or have an accident in the mine (figure 35 below). Mesa for mine work groups

can reach the equivalent of hundreds of pounds sterling in price. The annual purchase of *mesa* by mine work parties for the offerings made to *Tío* require the right symbols and correct form of completion of transactions for exchange. These include a communal meal and *ch'alla* with the stallholder who supplies the *mesa*. Final decisions on which stallholder to purchase from were made by bargaining with crates of beer to serve the mine-worker teams. The beer was drunk with the stallholder while the *mesa* were prepared, to complete the tradition of communal consumption and *ch'alla* (offering to the *Pachamama*) for the purchase of the *mesa*.



Figure 35. Medium size *mesa blanca* offering for a mine.

Preparation of *mesa* requires two types or forms of cultural knowledge, the how knowledge and cultural why knowledge. The how, the process of production and the list of ingredients for standard *mesa* in Oruro city, was well known by stallholders and easily accessible for clients through the purchases of a *mesa*. By comparing ingredients used for different regions, and demands from different clients, stallholders build a working knowledge of variation through practice. Because of the diversity of *mesa* and

their ingredients, knowing the types of *mesa* itself becomes a specialisation which is unique to specialist stallholders. Knowledge of why, cultural symbolism of the *mesa* for specific uses, and the significance of ingredients used, requires knowledge of Andean concepts of healing; their classification, diagnosis and treatment. In Oruro, stallholders worked in partnership with specialist Andean healers. Stallholders recommended specialists who performed ritualised diagnosis and the ritual *mesa* cure, while the specialist healers requested clients purchase specific ingredients and *mesa* from their known stallholders. This exchange regulated the two specialisations providing healers with a guarantee to get the right ingredients and preferential prices, while stallholders gain a reputation and knowledge of the significance and meanings of ingredients. The preparation of a *mesa* for specialist Andean healers could take several hours. In the Fermin Lopez marketplace, specialist healers sat selecting specific combinations of *misterio* figures and ingredients which were discussed with the stallholder, with whom they swapped stories relating to the significance and uses of each ingredient and combination.

One of the first questions stallholders ask clients, requesting a specific ingredient, mixture or for a list of ingredients, is ‘what is it for?’ followed by ‘who is this for?’ and ‘who sent you to buy this?’ Stallholders were very critical of lists or information they thought were wrong or had not seen before. In a number of exchanges, stallholders questioned clients on who gave them the list, and would have no reservations in letting a client know if they thought they had been misinformed. In the same way specialist healers would check the ingredients of a *mesa* before performing a ritual and refuse to perform a *mesa* cure if ingredients were wrong or missing and wanted to know who it was purchased from. Both stallholders and specialist healers have a vested interest in their products being complete, to fulfil expectations and be accepted as efficacious. The specialist stallholders identified themselves over other market traders using cultural forms of knowledge to explain the reason why certain ingredients were included, and gave explanations of the relationship between the selection of an ingredient and their role in Andean medical terms. This enabled clients to compare with other less experienced stallholders, who offer larger *mesa* with more ingredients for lower prices but without clear explanation of their symbolism. Specialist healers were as reliant on stallholders for preparing the *mesa*, as the stallholders were on the specialists for the selection of ingredients or alternatives for use categories and their symbolic meaning.

Together the stallholders and specialist healers form a self-regulated institution that is solidified in part through their ongoing trade and exchange of knowledge.

By understanding the variation and context of the *mesa* it becomes possible to understand how the use of material objects, often with no direct primary biomedical health outcome, are linked directly to health, and that the ritual performance of the *mesa* acts as a historic record of their use and the resulting interaction of the people, their environment and their health. This enables a better understanding of the importance of the role of local cultural knowledge and symbolism in the selection and use of ingredients in the *mesa*. If *mesa* were adapted or reduced to the rural context, based around agriculture, or to styles of *mesa* used in other cities, then they would lose this important link between the localised health needs of the people, including nutrition, prevention of illness and resource distribution, and the local environmental, economic and social factors that contribute to disease. The marketplace enables stallholders to have autonomy and independence from the cultural identity of other ethnic groups and state institutions that regulate ‘traditional’ knowledge, and define its origin as an apprenticeship in rural communities with specialist healers. Within the marketplace itself, individual stallholder’s success results from their ability to have an extensive knowledge of both ingredients and mixtures, which is acquired through networks with suppliers, to access specialist knowledge of ingredients, their local classifications, names and uses, and with specialist healers, for cultural knowledge about variations in the uses, forms and preparation of the different *mesas*.

However, specialist healers are not the only source of cultural and symbolic knowledge, participation and performance of *mesa* offerings at ritual sites in Oruro city play an important role for stallholders. These experiences and performances provide the symbolic significance of ingredients and images used in rituals, are told through stories that relate to the social and economic history of Oruro city, and define the cultural identity of the *mesa* of Oruro city Fermin Lopez marketplace. The participation in multiple social networks require stallholders to engage in Andean social institutions that tie people into social obligations, and in turn enable them to access cultural information about Andean forms of representing knowledge that give economic value to their products. The social institutions and ritual obligations of ritual sites in Oruro, and the

marketplace itself, act as a regulatory system to transmit the body of knowledge represented by the *mesa*.

9.4.1 Ritual and the transmission of knowledge outside the market place

In addition to their historic identity as part of the central marketplace of Oruro city, the stallholders are also linked to the identity of the city through the performance of offerings of *mesa* at ritual sites across the city. The city of Oruro extends out from around the northeast base of a series of twelve hills that form an important part of the city's historic, cultural and symbolic landscape, represented by the ritual sites found there. The ritual sites of the hills and surrounding landscape relate to the traditions, customs, stories and myths that form the folklore of the current city and its residents. These beliefs and knowledge also form an ongoing oral record of the city's social history and ecology, and provide a basis for constructing localised cultural identity and cross cultural transmission of knowledge to justify selection of ingredients and the efficaciousness of the *mesa*.

The northernmost hill, to which Oruro city extends, has the *Socavón* (mine entrance) to the silver mine San Jose, around which the city developed. Following the discovery of an image of the Virgin Mary in the entrance to the *Socavón*, a church was built over the mine entrance. The site now acts as the centre of pilgrimage for the annual carnival for Catholic and Andean devotees to the *Virgen del Socavón* (Virgin of the mine entrance). The Virgin has become a symbol of protection for the city's miners as well as all other residents, and forms the basis of Oruro city's identity. Other ritual sites of importance in the city are the Condor, a stone outcrop in the south west, the *Serpiente* (serpent) a stone formation in the southern hills, a concrete toad figure, that replaces the original stone in the shape of a toad known as *El Sapo* (the toad), that was blown up during the 1970s dictatorship, and the *Arenales* or *Hormigas* (sand or ants) to the north. The sites are related to myths and stories of the region and city, and form part of the myth and annual rituals of the carnival of Oruro city. These ritual sites are used by individuals of local communities, neighbourhoods, or *barrios*, in the city as well as the market stallholders of Oruro. The use of different sites gives residents of Oruro a symbolic form to identify their neighbourhood and urbanity; recent migrants and longstanding

residents use different sites in an ongoing social discourse that relates to resource distribution.

Performing annual rituals and offerings at one of these locations provides an opportunity to pass on traditional knowledge on the preparation and significance of ingredients to your neighbourhood. Each stallholder's family takes part and invites one or two guests who assist with the preparation of *mesa* on the stall. By performing this ritual, stallholders also gain credibility with clients, notably with specialist healers who recognise the importance of completing these and the specific locations of symbolic importance. While established residents performed rituals at the Condor, recent migrants performed rituals at other sites, distinct to each stallholder's residential zone, or at ritual sites in their community of origin. This creates a highly stable form of horizontal transmission of ritual and other knowledge within families of stallholders outside of the marketplace. The *mesa* is prepared out of sight of the other stallholders and is unique to that stallholder; it is a result of generations working at the marketplace and extensive knowledge of the symbolism of colours, shapes, and directions of ingredients used for the *mesa*. These *mesa* were much larger than those prepared in the marketplace and had specific ingredients that were rare and of high value, including specific sub species of *k'oa* which are not sold in the market. The performance of the rituals at the Condor represents a highly specialised and specific knowledge, and were only performed by the two most reputable and successful stallholders of the Fermin Lopez market.

The ritual forms an important means of transmitting cultural knowledge and practice of 'ritual rules', forms of preparation, and symbolic meanings of ingredients and the significance of their form or location in the mixture. This knowledge is not readily accessible to other traders within the market system. However, it is transmitted between consumer and supplier on an individual basis through discussions and individual purchases. From my participation in rituals across the city, in rural communities and with stallholders, I found the location, selection and significance of the ingredients varied between the urban and rural settings and for different ritual sites within the city or in the countryside. The ability to access knowledge about rituals is based on membership or acceptance into social institutions as a member or client. Transmission of ritual knowledge and traditions of Oruro city is not simply a consequence of

membership to the marketplace, union or *fiesta*-cargo system, but involves participation in rituals of the local institutions of the city itself.

9.5 Summary

The ethnic groups in Bolivia have different forms of healing and specialist medicinal plant knowledge. In Oruro, people continue to ground their different ethnic and cultural identities in a sense of tradition, both with regard to place and the historical past.

Medicinal plant stallholders use their affiliation to market unions to access commercial space in the city centre, to maintain autonomy of their products and commoditise their local form of *mesa*, a traditional urban medicine. Stallholders define their identity and knowledge as ‘traditional’ in a national and global discourse of health by participation in public display, parades and rituals of the marketplace. This enables them to define their products as ‘traditional’ and local, placing them outside both state regulation of trade for medicinal plant products and the local rural communal systems for indigenous medicinal knowledge and rural forms of *mesa*. The use of Andean social institutions, such as the *fiesta*-cargo system and *fiesta* sponsors, in the central marketplace enables the establishment of an internal hierarchy among stallholders, and creates a social mechanism to enable the transmission of cultural knowledge as ‘ritual rules’, related to local traditions and cultural knowledge of the city. This creates ‘traditional’ knowledge located in Oruro city, a cultural centre with its own traditions, history and identity, and ‘indigenous’ knowledge of rural communities with specialised local forms of knowledge produced from their community’s history, territory and socio-economic reality.

Following the promotion of Andean traditions and performance of *mesa* ritual in public places by the political party MAS and the election of President Evo Morales from Oruro in 2005, the *mesa* rituals are now more prominent in the public sphere. They have become a commodity to express indigenous traditions drawn from the past and located in rural ethnic communities. The process of using the *mesa* as a political commodity of national ethnic identity has in turn led to the localisation of indigenous knowledge in the rural community and past, and not, as this thesis argues, as a dynamic and localised contemporary system that represents a complex set of social, economic and environmental knowledge about present day ecological resource use and distribution. Specialist stallholders use local rituals performed in Oruro city to transmit the local

knowledge of health and urban life in Oruro city. Specialist stallholders in Andean medicine in Oruro city are an important part of the local medicinal knowledge system, and are a group who have been overlooked in conventional studies of traditional knowledge and its transmission.

Chapter 10

Conclusions

10.1 Summary

This thesis has explored how knowledge of the use and trade of medicinal plants and their properties are represented and transmitted in the marketplaces of Oruro, Bolivia, focusing on folk nomenclature, folk classification, beliefs and rituals. The study has found that the marketplaces are self-regulating systems that incorporate Andean cultural mechanisms for the production, reproduction and transmission of knowledge of medicinal plants and the herbal remedies and other treatments, both traditional and biomedical, that use plants. Knowledge of the plant and plant mixtures' biological properties for prevention and cure of illness was transmitted between providers from different biocultural regions, other traders and consumers using common medicinal explanatory models of humoral properties and Andean concepts of duality and opposites that located them in the local cultural context. The concept of *completo*, to be complete, underpinned knowledge of the selection and combination of plants from multiple ecosystems and altitudinal levels, which effectively broadens the chemical compounds available, the complexity of mixtures and regulates resource distribution. The desire to produce complete mixtures requires the transmission of knowledge between various suppliers, market stallholder and consumers. The findings show that in the market based exchange system centred in Oruro city, medicinal plant knowledge has not diminished, but takes on a new form. Market stallholders act as important intercultural mediators for specialist biocultural medicinal plant knowledge, and marketplaces form centres for cultural knowledge transmission.

For the purposes of summarizing findings and discussing their relevance, I follow the order of previous chapters and discuss the basic approach and field site (chapters 3 and 4); the kinds of medicinal plants traded, their classification by market stallholders and the concept of a 'chemical landscape' for understanding how medicinal plants are selected from multiple ecosystems and altitudinal zones (chapter 5); the underlying

cultural systems of illness and healthcare and the transmission of knowledge between producers, and specialist and non-specialist consumers (Chapter 6); and the different kinds of markets-their structures and functions-and the way transmission occurs in them (chapters 7-9).

The fieldwork for this study was centred in Oruro over eighteen months between 2005 and 2007. Through participant observation in the markets of Oruro, the identification of collections of plant-based medicinal products, and interviews with various producers, traders and consumers of medicinal plants, I was able to collect information on the medicinal plants used and traded, the way they are named and classified, and the conceptual framework of local medical systems that underpinned their use in herbal remedies and ritual mixtures. I observed how traders interacted with plant sellers and buyers of their products, and recorded the varied ways plants were discussed and the kinds of information that were conveyed in each transaction. I also investigated the marketplaces themselves, how they are structured, how they function, and how they are changing and being redefined in relation to state intervention and identity politics, and how this in turn affects the trade in medicinal plants.

Oruro's geographical location, between northern and southern ecological regions, and the periodic marketplaces held there, enable exchange of products from the different ecological zones of the central Andean region creating a diverse natural pharmacopeia in Oruro. Oruro's location and market system also define the characteristics of the local specialist market stallholders and medicinal plant mixtures produced there. The system of annual markets in Oruro separate ecological regions by time and not geographic space and enable specialised traders from Oruro to purchase produce directly from producers from the northern and southern ecological regions at the different markets. This unique adaptation and exchange system incorporates the regional communal based exchange system described by Murra (1995) as 'verticality' into an interregional market system based in the Altiplano. Oruro's geographic position in the market network has enabled the establishment of groups of specialist medicinal plant stallholders in the region and accounts for the presence of specialist traders the *mamaquitas*, *tataquitos*, *kapachaqueras* and the specialist stallholders in Oruro city's central market, the Fermin Lopez market. The specialist groups of medicinal plant stallholders found in Oruro are the result of adaptation to the region and its position in the wider exchange and trade

network of the central Andes. Market stallholder's decisions about which products they trade are in direct response to multiple notions of health, ecology and the socio-economic circumstances in which they are embedded.

In the medicinal plant market of Oruro, over 200 medicinal plants and plant parts from across Bolivia are selected from over 1,600 species that are known to have medicinal uses. In the marketplace, plant names were composed of binomials and trinomials to differentiate the variation in chemical potency between different botanical plant species from distant regions and those species able to act as substitutes. The classification systems used by specialist market stallholders were able to differentiate a plant's potency and how its properties were altered when used in mixtures. By using classification criteria from common explanatory models for plant efficacy, stallholders were able to justify and regulate the selection and combination of the pharmaceutical properties of the plants for the prevention and cure of biological illness.

The review of Andean nomenclature, folk taxonomy and medicinal categories used for plants in the marketplace of Oruro has uncovered an overlap between plant classifications as 'natural kinds', and classifications based in their 'function' or 'use' as medicine. Understanding how these classifications are used and interpreted has revealed how specialist traders and local producers and consumers varying forms of classification interact in the marketplace. Criteria used in medicinal plant nomenclature and classification in Oruro includes colour, plant gender (female/male), place names, and environmental features. Specialist market stallholders who buy and sell plant material and remedies used these same terms in a *special use taxonomy* to mark the presence, absence and degree of a plant's medicinal properties, rather than to classify the plants themselves.

This study took the chemical compounds produced by plants as the basis of analysis to understand how the variation in species found on market stalls and in medicinal plant mixtures were related to exchange and trade patterns. Developing a 'chemical landscape shows how the exchange patterns between ecosystems and altitudinal levels recorded in the marketplaces of Oruro, broaden the range of medicinal plant compounds available and contribute to the complexity of mixtures. The results demonstrated that by using a specialist classification based on the chemicals present in plants, medicinal

plant stallholders are able to substitute endemic or limited supplies of plant species with locally available substitutes, and in doing so prevent over exploitation of single species populations and maintain a complete natural pharmacopeia.

Traders used humoral categories of hot and cold, and Andean explanatory models for illness (e.g. fright or wind), and treatments such as *kuti* (to return an illness), to describe plant's medicinal attributes and to justify the efficacy of plant species and their combinations as medicine. The classification of plants into the categories of hot and cold by market stallholders highlights variations in specialist classifications of plant properties when used as individual species and when used in combination.

Understanding the classification criteria for the culturally specific categories enables an analysis of the role of Andean cultural beliefs and rituals as a form of knowledge transmission in the market chain. This was explored through market stallholders' descriptions and sale of the specialist mixtures. Market stallholders use folk taxonomy and the Andean explanatory model of energy exchange and 'returning illness' to justify the selection of dark colours and diversity of maize varieties used in ritual offerings.

These classification systems enabled transmission of indicators of the medicinal antioxidant and nutritional properties of diverse varieties of maize when consumed in the diet, to regulate farmers' selection of varieties and field planting schemes. The use of folk taxonomy, cultural beliefs and ritual for specialised maize varieties, sold for good luck and used in healing rituals, enables the transmission of knowledge of the plants' medicinal properties between producers and consumers who are separated by distance. These examples demonstrate that medicinal plant knowledge is both transmitted and regulated in the marketplace of Oruro.

This study has found that marketplaces are important sites for the transmission and production of medicinal plant knowledge. Analysis of folk classification found that plant names change between different locations and settings, and that local names differ to those used in central marketplaces. While plants do not always travel with their names, their uses and symbolic meanings are located in the context of their use in the marketplace. This finding challenges typical studies of knowledge transmission that are based solely on a conception of ethnobotanical knowledge as just names and uses of plants. Traders demonstrate that knowledge is more complex than this, and its transmission is likewise more complicated. Rather than discuss plants per se, medicinal

plant stallholders in Oruro were found to use specialist knowledge in the form of classifications that related to the plant's chemical constitution and potency, and it is this that allows knowledge of plants to flow through the marketplace.

This study has found that the Andean health system in Oruro combines a series of cultural practices involving performing rituals on set dates and at annual markets, to form a series of treatments for the prevention of illness. These treatments combine plant biological functions with functions as symbolic objects in a social context to alleviate stress and psychosomatic illness and lubricate social networks to enable access to resources. The periodic consumption of mixtures of plants sold in the annual *feria* of Oruro incorporates their chemical properties as a cultural form of prevention and cure or 'cleansing' of parasites, debilitating illness or vectors of disease. The annual markets provide an opportunity for traders to sell plant mixtures for annual cleansing and form part of a local form of the Andean cultural system for health.

Specialist healers previously located in rural communities are now spread across rural and urban areas. The form of the Andean health system found in Oruro has adapted to changing population distribution with the adoption of a market-based distribution system centred in cities that extends resources to remote rural communities. Medicinal plant knowledge is transmitted through encounters between specialist medicinal plant traders, consumers and specialists at marketplaces. Specialist medicinal plant stallholders are an important source of information for healers who no longer collect plants themselves, showing a shift away from localised and specialist knowledge held by healers, to distribution through marketplaces and specialisation of market stallholders in selection and preparation of medicinal plant remedies.

As a social and economic space, marketplaces form cultural centres and create specialist local knowledge of the medicinal plants traded there, and of the remedies made from them. Each marketplace and *feria* reflect the local culture and address the local health requirements of the population. This localised knowledge and the products are reflected in the cultural identity of each marketplace. Medicinal plant products form two social, economic and medicinal categories in Bolivia: 1) natural herbal remedies and 2) traditional medicines. However, interpretations of the efficacy of each category vary between local, national and global levels and each medicinal plant category has political

and institutional connotations. Natural herbal remedies consist of industrial pharmaceutical extracts and medicine; the cottage industry of plant medicine and mixtures; and registered *naturaista* herbalists. These are all registered businesses that conform to state regulations and western medical explanatory models for plant efficacy defined by the chemical properties of individual species. Traditional Andean medicine has two forms: traditional herbal medicine and traditional ritual medicine. Traditional medicine is self-regulated by its practitioners, and its efficacy is defined by local cultural terms and medical explanatory models.

Natural herbal medicine is regulated by SOBOMETRA (Bolivian Society of Traditional Medicine), while Andean traditional medicine is represented by AMETRA (Association of Traditional Medicine), who represent the community-based Andean healers. Both organisations have political recognition and representation for their practitioners in Bolivia. The organisations also regulate the forms of knowledge transmission. Traditional knowledge of local communities is regulated by civil-religious organisations in the community itself. Marketplace stallholders' specialist medicinal plant knowledge is not recognised by the state or rural communities as distinct and complementary. Market stallholders use membership of market unions and *fiesta* sponsorship to define themselves against state organisations and rural communities, and to regulate their knowledge transmission. The traditional forms of ritual practice provide both identity and continuity of cultural knowledge.

In the rural marketplaces, the identity of the medicinal plants are based on images of the rural area and associated with indigenous people and traditional Andean medicine. The annual *feria* held at the town of Huari in the department of Oruro is considered the largest and most important market for the exchange of traditional medicinal plants in Bolivia. The patron saint of Huari represents Andean belief in healing and is the basis to conform the socio-economic institutions of trade. In the suburbs of Oruro city, the new social identity of recent rural migrants and the knowledge they bring is transformed into 'natural Andean herbal medicine', regulated by the Andean requirement to complete a mixture with products from multiple ecological regions. In Oruro city's central marketplace, the Fermin Lopez market, the medicinal plant mixture known as *mesa* used in Andean curing rituals, is the main feature and identifying characteristic of this centre for traditional Andean medicine. Stallholders in the Fermin Lopez market

define their reputation and identity through the market and city's cultural history, and the socio-economic reality of commodities and mining to Oruro city represented in the *mesa* mixtures they sell. In the city centre shops, pharmacies and trade exhibitions, plant mixtures are dislocated from the Andean forms of distribution and take on the form of biomedicine, located under licenses and regulated by the state for commercial sale.

In Oruro city, at the annual market known as the *Feria del Norte*, the medicinal plants leave behind the local 'traditional' rural marketplace identity of the southern Altiplano and the fairs of Huari, to take on a urban identity that combines tradition and modernity. The combination of the modern urban identity and the fresh plants used by stallholders there promote mixtures sold as 'traditional Andean' herbal remedies. The mixtures are a complex combination of plants that form a distinct category of medicine and knowledge, which is regulated through Andean cultural systems for inclusion of plants from multiple ecological regions and to act as prevention and cure of illness. By combining the Andean explanatory model *completo* for the efficacy of the mixture, and not solely with individual plants properties, traders are able to substitute plants and distinguish themselves from the biomedical explanatory model used by *naturistas*. The Andean socio-economic system of exchange encompassed in the concept of *completo* enables substitution of species, prevents exploitation of single species and can be used to regulate the toxicity of the mixtures. It also prevents suppliers gaining a monopoly and increasing prices for individual products or regional ingredients.

This study shows that medicinal plant use is an integral part of primary health care, as well as local communities' health care strategies in Bolivia, and is also of importance to wider society. It is widely accepted that different groups of people take on different roles in society and have local and specialist knowledge about the production and consumption of medicinal plants, and plant uses need to be understood in a cultural context where pluralistic medical systems exist. Anthropological studies have shown that ethnic groups are very rarely isolated and are often dependent on extensive and complex exchange networks to acquire their resources. Further, it is understood that in Oruro the concept of health itself is a product of the combination of ecological knowledge for the production of social systems, and the exchange and distribution of resources. It follows that medicinal plant knowledge combines people's ongoing

experience of how the selection and use of plants influence their health both directly and indirectly, in relation to the environment and as a resource for exchange. This study demonstrates how exchange networks enable the transmission of cultural and technical knowledge of specific properties of plants for specific uses and the underlying classification criteria for health outcomes between groups who do not meet in other areas and are separated by distance, social or cultural barriers. The results show that marketplaces and market traders perform an important role in the transmission of knowledge between these groups and use commonly accepted explanatory models for a plant's properties to mediate between specialists and non-specialists who may use different classification systems.

The social, economic and ecological contexts that impact stallholders' decisions are themselves formed from the multiple levels of local, regional and global trade relationships. Stallholders' forms of participation in multiple socio-economic institutions define levels of access to market space, information, and contribute to their reputation within the marketplace. Their participation in multiple roles of the household, marketplace, religious and political groups allows traders to form extensive social networks. In Oruro, the stallholders use Andean mechanisms of ritual and civil-religious organisation to regulate the marketplace and transmission of this knowledge.

In considering knowledge distribution, market stallholders form a specialist group with subdivisions and a hierarchy of knowledge distinct from that of producer communities or specialist healers. Their access to knowledge from multiple localised groups and specialist healers places them in a privileged position. Their ability to define the boundaries and criteria for a particular medicinal remedy category in response to local socio-cultural context and classifications is key to their success as traders. Through careful questioning, they are able to interpret and translate their clients' categories of illnesses, plants and medicinal remedies' names, and provide clients with the products, and information that fit culturally defined explanatory models of illness. Over time, and through repeated experience with clients from a diverse cultural range, and plants from many locations, traders develop a substantial body of knowledge that enables them to contextualise the use of plants between different contexts of cure, prevention or social symbolic roles.

This allows me to conclude that the medicinal plant markets of Oruro reflect the multi-niche economy present today in the central Andes. Market stallholders' stock is defined by the local, regional and global trade relationships that create the niche market of medicinal plant products. The hierarchy of marketplaces and traders' status is regulated through a highly structured social system. Within this system, traders' status is represented by the diversity of products from multiple ecological regions that they stock, the social status of their clients and their ability to manipulate an extensive social network for prestige events. A trader's relationship to the market establishment and how long they have been in the marketplace are also important determinants of their social status.

As people move through the hierarchy of the *cargo* system they gain experience and knowledge of stories and myths that link a symbolic landscape of social relations for the individual within the community and between the community and external institutions. The performance of rituals enables rules to be learnt for the preparation of ritual offerings and forms of symbolic exchange between the community and environment. Two recurrent and interrelated themes found in the rituals and social order are: 1) the need for the ritual offering or *mesa* to be whole, complete, to have all the ingredients and for the communal authorities' social structure need to be whole and 'complete'; and 2) for the parts or ingredients in the *mesa* offering to be complementary, having both male and female parts, and for the couple and role of authority to have female and male representatives. For Andean communities the whole implies the participation of each member of each part in the community and each ecological zone or tier they represent through the products in the ritual offering from each ecological region. Complementary maleness and femaleness is found in the role of authority to enable balance, and is replicated in the symbolic male and female ingredients used in ritual *mesa* offerings.

The results show that the marketplaces in Oruro are unique cultural centres with specialist knowledge that results from their location in a network and the multiple specialist knowledge systems that interact there. This is distinct from the knowledge of ethnic groups and specialist healers'. These findings agree with findings and theory on the marketplace as a cultural centre able to regulate international trade (e.g. Bestor 2004). In understanding how this cultural knowledge is formed, studies need to trace the history and interrelation of knowledge and marketplaces in global processes.

The marketplace is open to the public and as such both plants and information are apparently 'freely' available, when compared to communities. The transition from personal to public underwrites intellectual property rights of a community placing it in the public domain and individuals' hands. The second issue presented by marketplaces is the lack of clear guidance as to the limits of a defined community and at which point a client, either supplier or consumer, is part of that community. This unclear boundary lays the foundations for defining how knowledge is represented and protected by the traders and stallholders themselves. The common notion that the marketplace is an open public space, where products are sold and information is readily available, lies in contrast to my own findings where not all knowledge is readily available to all and knowledge is not evenly distributed in time or different places within the marketplaces. How we mediate between these two forms of knowledge distribution provides ample material for debate, and until it has become more clearly established, the boundaries of the marketplace appear to have no legal communal restrictions.

To further emphasise this point, if a producer or specialist healer enters the urban marketplace to sell plants or services, at which point does his knowledge become public? When he leaves the geographic boundary of his community or when he offers his products or knowledge for economic gain? Where is he acting as an individual and not as a community member? Are all people present in the marketplace, as a public space, free game to anthropologist and pharmaceutical companies, beyond communal rights and only under national laws? The practicality of such research in marketplaces could not possibly expect agreements with all communities participating in market places for intellectual property rights, and are thus covered by state or international regulations. This individual's ability to share information outside their community is open to exploitation, yet it is the fundamental form of the marketplaces and the key role they play in knowledge transmission. The marketplace, contrary to common belief, is not as open and public as one might think. It is a highly regulated social space with clear rules of conduct, where sellers regulate access to information, as this thesis shows. It is precisely its role as an internally-regulated community that defines the conduct of individuals within it and the transmission of knowledge within and to other groups outside.

10.2 Significance of findings

This study has shown that in market exchange systems, ethnobiological knowledge is produced by the process of trading, and that medicinal plant traders use specialist classification systems. Analysis of variation in medicinal plant classification found that traders use complex classifications that alter with the context of a plant's use, and the marketplace provides a rich source of medicinal plant knowledge that can only be understood in its cultural context. The findings support the ethnobiological theory of cross-cultural knowledge transmission (Ellen 2003) and the need to understand the cultural context in which classification structures are embedded.

The socio-economic systems described in this study, used to regulate the marketplace, show that marketplaces cannot simply be dismissed as unregulated systems that respond solely to the economic principles of supply and demand, causing the exploitation of natural resources and unregulated distribution of potentially adulterated mixtures of plants. In the Andes, where communities have extensive experience of exchange, these cultural systems and processes are incorporated into the marketplace exchange system. Such social systems are important contexts of ethnobiological knowledge that merit further research, and can be used to regulate the use of natural resources. The importance of local cultural values which are used to regulate trade, as shown by the cases of *Tata Santiago* in Huari and *El Señor de la Paciencia*, patron saint of markets in Oruro, highlight how local beliefs can be used to facilitate knowledge transmission.

Traditional knowledge not only represents the basic classification of plants and their medicinal uses but also the complex inter-relation between humans and the environment. Although transmission and access to knowledge is defined by the social institutions that regulate practice and participation in cultural experiences, the redistribution of the population to urban centres and the adoption of market exchange has also seen a shift in the form and distribution of medicinal plant knowledge. The increase in the population of the city has also increased the number of traders and specialisation in products that are both regionally and culturally appropriate. Urban medicinal plant knowledge incorporates aspects of health care that are relevant to urban populations and cannot be directly compared to rural systems.

The centralisation of exchange in market centres has shifted the medicinal plant system, formed from specialist healers in local communities who acquire produce through their travels, to dependence on marketplaces and the specialist knowledge and skills of market stallholders. In turn, this has required increased forms of identification by specialist traders to regulate their products and avoid charlatans. The development of market places has increased the number of specialist stallholders and the amount of time they spend together and with clients. The use of marketplaces to source plants by specialist healers, rather than collecting them themselves in Oruro, has driven the development of the number of transmission events in which market stallholders participate and the development of social systems that regulate the quality and forms of medicine. The shift to a market system has not reduced the knowledge but transformed its distribution within the social system. It has also enabled a high level of specialisation with multiple healers reliant on the knowledge of highly specialised market stallholders. This in turn enables market stallholders to practise and learn on a more regular basis than if they were isolated in communities located on the periphery of market systems. The market system has enabled a movement from multiple specialists located in communities to central marketplaces and specialist market stallholders. What is clear from this study is that medicinal plant, ethnobiological and cultural knowledge loss cannot simply be measured by a quantity of plant names and uses, and medicinal plant knowledge cannot be reduced to western categories of medicinal and ritual, based on the biomedical properties of the plants. Ethnomedical plant knowledge encompasses plant use to cure and prevent illness, variations in their properties when used in combination, phytonutritional properties, and use for the control of transmission and vectors of disease in the natural environment. This study demonstrates that in interregional market exchange systems, medicinal plant names and uses alone are an inadequate measure of how ethnobiological, ethnopharmaceutical and medicinal ecological knowledge need to be represented in their cultural context.

10.3 Future research

This study was limited by the collection of data from marketplaces of a single geographic region, the inability to identify all the plant specimens collected to variety level, ecological region of origin or relate species to chemotaxonomic classifications and their relational chemical properties. Future studies that pursue these needs will be able to uncover, with a greater degree of precision, how the trade and regulations for

plant use and combination in mixtures recorded here function in pharmacological, phytonutritional, socio-economic, and ecological contexts. Previously, medicinal plant studies have focused on either economic aspects of the trade to supply plant material, or on knowledge of specialist healers, and not the traders and marketstallholders themselves. Such studies have not distinguished between the role of supply, diagnosis or performance of healing and the skills needed for the selection, combination and substitution of species for the preparation of medicinal mixtures, and to maintain a complex pharmacopeia. With the increase in urban populations, and adoption of market exchange, future studies of the role of the 'master herbalist' who prepares mixtures, and the 'natural pharmacist' who maintains stocks of plants, suggest important knowledge systems which merit further research, beyond simple lists of plant species and their uses. Future studies of folk or traditional medicinal plant systems that incorporate analysis of the variation in uses of plants in local health systems and in commercial systems will provide a basis for comparing the findings in this study to understand how traditional knowledge is represented, transmitted and distributed between specialist stallholders and healers in marketplaces and urban settings.

This study has found that the process of maintaining a diverse stock, and preparing mixtures, is a specialist practice that medicinal plant market traders have taken on and perform independently and alongside specialist healers and constitutes specialist knowledge. The selection of species and preparation of mixtures is a distinct and specialist knowledge that requires knowledge of, and experience with plants from multiple ecosystems, and cultural encoded knowledge of how the combination and substitution of species meet different specialist forms of healing and clients' cultural perceptions of what is efficacious. The findings from this study that traders have the knowledge to substitute locally available plants in place of rare species which are difficult to obtain, and the assertion this can reduce the risk of over-exploitation, certainly merits further investigation. The study of these systems, in comparison with other market systems in the world, will provide material for future research on the role of socio-economic and cultural systems in regulating exchange and use of medicinal plants. This study provides a basis to analyse other regional medicinal market systems and the economic, ecological and biological rationale for the selection and inclusion of plants in localised health systems that is not determined solely by each plant's individual efficacy for curing biological illness. Future research will need to consider

the impact of identity politics and state regulation of markets and traditional medicinal plant systems in urban settings to record how these influence the transmission and production of interregional ecological and medicinal plant knowledge between consumers and producers.

11 GLOSSARY

<i>Akullicar</i>	Quechua: to chew coca leaves with ash.
<i>Ajayu</i>	Quechua / Aymara: one of three souls a person has, loss or capture by malevolent spirits can result in serious illness and possible death.
<i>Alma</i>	Spanish: literally 'soul': in Andean medical system it is the second of three souls.
<i>Alcanzar</i>	To give an offering to 'spirits'.
<i>Altiplano</i>	High Andean plateau forming the western strip of Bolivia, average altitude of 3,700 metres above sea level.
<i>Awayo</i>	Quechua / Aymara: cloth, the design is used to identify ethnicity or social class, practical use to carry and displaying goods and specialised designed <i>awayo</i> are used for preparing rituals on.
<i>Brujo</i>	Derogative term: a witch or sorcerer who inflicts ill health or problems on others.
<i>Casera(o)</i>	Regular customer or supplier.
<i>Chiflera</i>	Petty trader.
<i>Chola</i>	'Urban' woman dressed in <i>pollera</i> (skirt), <i>manta</i> (embroidered shawl), and felt bowler hat, with long plaits and flat shoes. 'The style is considered a hallmark- but not exclusive province of market traders' (Beuchler and Beuchler, 1996: 237). Derogative term used for individualistic action and self-gain.
<i>Chiwchi mesa</i>	Quechua / Aymara: small packet used for the mesa offering, with lead figures 7mm high, seeds from tropical lowlands and gold or silver.
<i>Compadre</i>	Non-kin relation who has financial support.
<i>Completo</i>	Spanish: literally 'to be complete': used to describe an efficacious medicine which has the right combination of culturally defined parts, and not simply a list of ingredients.
<i>Curandero</i>	Specialist in traditional healing.
<i>Ch'alla</i>	Quechua / Aymara: ritual libation.
<i>De vestido</i>	A person who dresses in European or modern clothes.

<i>Don</i>	Mark of respect for men.
<i>Gringo</i>	Foreigner, typified by western American or European tourists.
<i>Jampiri</i>	Quechua: traditional healer, specialising in mixtures of plants for internal and external medicine.
<i>Kapachaquera</i>	Quechua / Aymara: market seller of traditional medicines.
<i>K'oa</i>	See <i>q'uwa</i> .
<i>Kuti</i>	Quechua: literally 'turn': used in Oruro to describe returning or exchange of energy or illness of a person to the environment.
<i>Mesa (or misa)</i>	Quechua / Aymara: preparation of multiple ingredients used for protection, healing and as an offering to spirits in agriculture, social, economic and political orientated rituals. Includes categories of <i>q'uwa mesa</i> , <i>mesa blanca</i> , <i>dulce mesa</i> and <i>mesa negra</i> . Spanish: literally table.
<i>Misterio</i>	Spanish: literally 'mysteries': flat biscuit, 4 x 4 cm that feature images of objects and deities, used for <i>mesa</i> offerings.
<i>Originario</i>	A land holder who can trace community membership back to at least the 19th century.
<i>Paceño</i>	Person born in the city of La Paz.
<i>Paco</i>	Slang for police officer.
<i>Pampa</i>	Quechua: flat expanse of land, or plains.
<i>Pachamama</i>	Quechua / Aymara: term originating in Quechua, often translated as 'mother earth', is used to refer to the 'spiritual' and natural environment in representations of human relation to earth in Andean rituals and beliefs.
<i>Pollera</i>	Wide skirt with pleats and petticoats that typifies the dress and identity of the <i>chola</i> and associated with market traders in the Andes. Made of wool or cotton worn by peasant women; or velvet, heavy synthetic cloth or silk worn by urban <i>cholitas</i> . Length and style vary between regions.
<i>Paqo</i>	Quechua / Aymara: apprentice to a traditional healer.
<i>Paq paqo</i>	Quechua: charlatan traditional healer or quack.
<i>Preste</i>	'Section- or – community-wide sponsor (rural), neighbourhood, market, or factory-wide sponsor (urban), also sponsor of fiestas for private saints' (Beuchler and Beuchler 1996: 238).

<i>Q'uwa</i>	Quechua / Aymara: resinous bush grown in the high Andes, 'used to cleanse the body of a patient and as a "condiment for the spirits" in magical offerings' (Beuchler and Beuchler 1996: 239).
<i>Q'uar</i>	Quechua / Aymara: act of burning a <i>mesa</i> associated with the <i>q'uwa</i> (folk genus, scented resinous bushes of the Altiplano) plant used as a base for <i>mesas</i> .
<i>Naturista</i>	Spanish: specialist healer who uses 'natural' medicine combining Andean and biomedical explanations, but not using ritual healing.
<i>Susto</i>	Spanish: literally 'fright': illness caused by fright, an etiology common in Latin America (Beuchler and Beuchler 1996: 238).
<i>Tambo</i>	Quechua: building with enclosed central patio used as a marketplace, traditionally <i>tambo</i> provide rooms for traders to stay and store stock in.
<i>Thola</i>	Aymara: 'firewood', in Quechua and Aymara refers to Andean bushes used primarily for firewood, which are woody and mainly resinous, principally species of <i>Baccharis</i> and <i>Parastrephia</i> (Beck and Garcias 2006: 61).
Tío	Spanish: literally 'uncle': Andean deity who rules below ground.
<i>Vecinos</i>	Spanish: literally 'neighbours': in Bolivia this refers to a group who meet to achieve social political influence for the sector they live in this includes development of services and control of marketplaces.
<i>Virlocha</i>	Term of social class used to describe a <i>chola</i> who has changed to modern European clothes; also used as an insult and derogative term.
<i>Yapa</i>	An extra amount given to a customer after the transaction is completed.
<i>Yatiri</i>	Aymara: literally 'the one who knows': specialist healer who can perform Andean rituals for community or individuals, for cleansing, agriculture and diagnosis of illness of natural and non natural origin, and diagnosis may include the use of coca leaf or cards.
<i>Yungas</i>	Quechua / Aymara: 'zone with a warm humid tropical climate'. In Bolivia the term is also used as the name for the geographic region of the northern valleys east of La Paz.

Appendix 1

Medicinal plant species, common names, vegetation forms and ecological regions

BOTANICAL FAMILY	GENUS	SPECIES	PLANT PARTS	LIFE FORM	COMMON NAMES	ECOLOGICAL REGION
Acacia			Resin	Tree	Goma arabica, angoma, goma, goma Bolivian kinchaman	Low valley
Adiantaceae	Notholaena	nivea (Poir.) Desv.	Flower leaf branch	Bush		
Aloaceae	Aloe	vera L.	Slice of leaf	Cactus	Sabila, aloe vera, savela	Andes
Amaranthaceae	c.f Pfaffia	sericea (Moq.) Kunth	Root leaf	Herb	Herbay yaron	
Amaranthaceae	Gomphrena	umbellata Remy	Leaf, flower	Herb	Hanko wira	Puna Andes
Amaranthaceae	Pedersenia	cardenasii (Standl.) Holub	Leaf, flower	Tree	Flor blanca	Lowland
Amaryllidaceae	Zephyranthes	sp.	Root, tubor	Herb	Orko orko, (macho or hembra)	
Amaryllidaceae	Allium	c.f ampeloprasum L.	Root tubor	Root crop	Ajo Castilla	Puna Andes
Amaryllidaceae	Allium	sativum L.	Buld, tubor	Root crop	Ajo macho,	Puna Andes
Anacardiaceae	Schinus	andinus (Eng. Ex DC.) I.M.Johnst	Seed, nut	Tree	Wistuliku, ulo ulo, ulu ulu	Lowland
Anacardiaceae	Schinus	molle L.	Leaf, branch	Herb	Molle	Andes
Apiaceae	Azorella	compacta Phil.	Branch	Bush	Yareta	Puna Andes
Apiaceae	Cyclospermum	leptophyllum	Leaf, stem, seed	Herb	Kita perejilla	
Apiaceae (Umbelliferae)	Foeniculum	vulgare Mill.	Leaf	Herb	Hinojo, enojo	Andes
Apiaceae (Umbelliferae)	Mulinum	ulicinum Gill. ex Hooker (sin: espinose)	Leaf branch	Bush	Choque cana, choque kana, choke kalla	Andes
Apiaceae (Umbelliferae)	Conium	maculatum L.	Vegetative parts	Herb	Enajo	Valley
Aquifoliaceae	Ilex	c.f tucumanensis* (Iryanthera juuensis Warb. Vandebroek & Thomas 2006)	Vine	Parasitic vine	Sangre tuyo, sangre tuya	Lowland
Arecaceae (Palmae)	Oenocarpus	c.f mapora Karst.	Seed	Tree		
Arecaceae (Palmae)	Bactris	gasipaes (Kunth)	Lut	Tree	Calavera, Tojhlo	Lowland
Arecaceae (Palmae)	Oenocarpus	bataua Mart.	Nut	Tree	Chaska margarita, Margarita, (comon lowland names for tree: batua, milpesos, seje, trupa, chapel, patawa, turu, ungurani, komboe, yagua and aricaugua)	Lowland
Aristolochiaceae	Aristolochia	fragrantissima Ruiz	Vine	Vine	Waje	Lowland
Aristolochiaceae	Aristolochia	sp.	Root	Herb	Hy pawake (hupa waje), Pampa waje, Pampa wasi	Low valley
Asteraceae (Compositae)	Achyrocline	alata (Kunth) DC.	Flower, stem	Herb	Wira wira	Puna Andes
Asteraceae (Compositae)	Achyrocline	c.f alata (Kunth) DC.	Leaf	Herb	Wira Wira	Puna Andes
Asteraceae (Compositae)	Achyrocline	sp.	Vegetative parts	Bush	K'oa	Puna Andes
Asteraceae (Compositae)	Achyrocline	sp.	Leaf branch	Bush	Koa, Hembra wira K'oa	Puna Andes
Asteraceae (Compositae)	Achyrocline	sp.	Whole plant	Herb	Wira wira	Puna Andes
Asteraceae (Compositae)	Baccharis	genistelloides (Lam.) Pers.	Leaf	Herb		
Asteraceae (Compositae)	Flourensia	riparia Griseb.	Leaf branch	Bush	Inti kurira, intikururo	Valley
Asteraceae (Compositae)	Hypochaeris	taraxacoides Benth. & Hook*	Root flower	Herb	Marancella	Puna Andes
Asteraceae (Compositae)	Lepidophyllum	quadrangulare Benth. & Hook.f.	Vegetative parts	Bush	K'oa	Puna Andes
Asteraceae (Compositae)	Lophopappus	foliosus*	Leaf, branch, flower	Herb	Santiago papo papo	
Asteraceae (Compositae)	Ambrosia	arborescens Mill.	Leaf	Herb	Altamisa, marco, markju	Andes
Asteraceae (Compositae)	Artemisia	absinthium L.	Vegetative parts	Herb	Artemisa, Ajenjo, ruda macho, ajinju	Andes
Asteraceae (Compositae)	Baccharis	alpina Kunth	Root leaves	Bush	Harilla, Haria	
Asteraceae (Compositae)	Baccharis	boliviensis (Wedd.) Cabrera	Leaf, branch, flower	Bush		
Asteraceae (Compositae)	Baccharis	incarum (Wedd.) Cuatrec.	Leaf, branch, flower	Bush	Nak'a tola	Puna Andes
Asteraceae (Compositae)	Baccharis	latifolia (Ruiz & Pav.) Pers.	Leaf, stem	Bush	Chilka	Low valley
Asteraceae (Compositae)	Baccharis	trimera (Less.) DC.	leaf branch	Herb	Kimsa kucho, (Kimsa kucho, quimsa K'juch), Karkeja	

Asteraceae (Compuesta)	Baccharis	microphylla Kunth	Vegetative parts	Bush		
Asteraceae (Compuesta)	Bidens	andicola Kunth	Leaf, flower	Bush	Muni muni	
Asteraceae (Compuesta)	c.f. Gnaphalium	graveolens M. Bieb. (ex HBK)	Leaf, branch, flower	H	Wira wira	Puna Andes
Asteraceae (Compuesta)	Chersodoma	jodopappa (Sch. Bip. Ex Wedd.) Cabrera	Leaf stem	Bush	Poco tula	
Asteraceae (Compuesta)	Chrysanthemum	coronarum L.		Herb	Santa Maria	Andes
Asteraceae (Compuesta)	Chrysanthemum	parthenium (L.) Pers.	Leaf, stem, flower	Herb	Manzanilla	Valley
Asteraceae (Compuesta)	Chuquiraga	atacamensis Kuntze	Leaf, branch, flower	Herb		
Asteraceae (Compuesta)	Chuquiraga	ferox Klatt	Leaf, flower	Tree	Kiswara peru	
Asteraceae (Compuesta)	Cynara	scolymus L.	Leaf	Herb	Alcachofa	Valley
Asteraceae (Compuesta)	Dasyphyllum	sp.	Vegetative parts	Tree	Espino	
Asteraceae (Compuesta)	Diplostephium	cinereum Cuatrec.	Leaf, branch, flower	Bush	K'oa, Wira k'oa	Puna Andes
Asteraceae (Compuesta)	Echinacea	purpurea (L.) Moench	Flower	Herb	Equinacea	Low valley
Asteraceae (Compuesta)	Erigeron	rosulatus Wedd.	Root	Herb	Valeriana hembra	Andes
Asteraceae (Compuesta)	Eupatorium	azangaroense Sch. Bip. ex Wedd.	Leaf, stem, flower	Herb	Mankapaki	
Asteraceae (Compuesta)	Gnaphalium	cheiranthifolium Lam.	Leaf, flower	Herb	Wira wira	Puna Andes
Asteraceae (Compuesta)	Gnaphalium	sp.	Leaf stem	Herb	Pas mara	
Asteraceae (Compuesta)	Gnaphalium	sp.	Leaf stem	Herb	Wira wira macho	Puna Andes
Asteraceae (Compuesta)	Loricaria	thyoides (Lam.) Sch. Bip.	Leafs, branch	Bush	kille k'oa	Puna Andes
Asteraceae (Compuesta)	Matricaria	recutita L.	Flower	Herb	Manzanilla	Valley
Asteraceae (Compuesta)	Mutisia	friesiana Cabrera	Flower, leaf branch	Bush	Kiswara, Chinchircoma	Puna Andes
Asteraceae (Compuesta)	Mutisia	hamata Reiche	Leaf, branch, flower	Bush	Chinchirkoma, chanca rami	Puna Andes
Asteraceae (Compuesta)	Mutisia	ledifolia Decne. ex Wedd.	Leaf, branch, flower	Bush	Chinchircoma hembra, kiswara	Puna Andes
Asteraceae (Compuesta)	Mutisia	orbignyana Wedd.	Vegetative parts	Herb	Kutu kutu	
Asteraceae (Compuesta)	Parastrephia	lepidothylla (Wedd.) Cabrera	Leaf, branch, flower	Bush	Quiru tola, supa tola, k'oa tola, tara tola, supu tola	Puna Andes
Asteraceae (Compuesta)	Parastrephia	lucida (Meyen) Cabrera	Leaf, branch, flower	Bush	K'oa, Queno, Ilena de agua, tola	Puna Andes
Asteraceae (Compuesta)	Parastrephia	quadrangularis (Meyen) Cabrera	Leaf, branch, flower	Bush	Ti ti tola, jamachi tola	Andes
Asteraceae (Compuesta)	Perezia	multiflora (Bonpl.) Less.	Leaf, flower	Herb	Diente de leon	Andes
Asteraceae (Compuesta)	Pluchea	fastigiata Griseb.	Leaf, branch	Bush	Uri uri	
Asteraceae (Compuesta)	Schkuhria	pinnata (Lam.) Kuntze ex Thell.	Leaf, flower	Herb	Jiyak pichana	Valley
Asteraceae (Compuesta)	Senecio	canescens (Hump. & Bonpl.) Cuatrec.	Leaf	Herb	Khea khea, wira wira del monte	
Asteraceae (Compuesta)	Senecio	clivicolas Wedd.	Leaves	Herb	Estevia	Low valley
Asteraceae (Compuesta)	Senecio	graveolens Wedd.	Leafs, branch, flower	Bush	Chachakoma, chachakoma hembra	Puna Andes
Asteraceae (Compuesta)	Senecio	phylloleptus Cuatrec.	Vegetative parts	Bush	Chachakoma macho, chachacoma, Lampazo	Puna Andes
Asteraceae (Compuesta)	Senecio	smithioides Cabrera	Vegetative parts	Herb		High Andes
Asteraceae (Compuesta)	Sonchus	asper All.	Leaf, flower	Herb	Diente de leon, leche leche	Low valley
Asteraceae (Compuesta)	Sonchus	oleraceus L.	Leafs, flower, stems	Herb		
Asteraceae (Compuesta)	Tagetes	multiflora Kunth	Leaf, stem, flower	Herb	Chichchipa, chijchipa, suiku, sullka, wakataya, suyko	
Asteraceae (Compuesta)	Tagetes	pusilla Kunth	Leaf, stem, flower	Tree	Anis	
Asteraceae (Compuesta)	Taraxacum	officinale (L.) Weber	Vegetative parts	Herb	Achicoria, diente de leon	Andes
Asteraceae (Compuesta)	Viguiera	procumbens (Pers.) S.F. Blake	Flower	Herb	Saka flor, sac'a	
Asteraceae (Compuesta)	Werneria	c.f. giaberrima Phil.	Roots, leafs	Herb	Maranzella macho, maranzella hembra, maranzella	Puna Andes
Asteraceae (Compuesta)	Werneria	dactylophylla Sch. Bip.	Leaf, flower	Herb	Sasawi	High Andes
Asteraceae (Compuesta)	Werneria	lycopodioides S.F. Blake	Leaf, branch, flower	Bush	Akana,	Puna Andes
Asteraceae (Compuesta)	Werneria	sp.	Roots, leafs	Herb	Maranzilla macho	Puna Andes
Asteraceae (Compuesta)	Werneria	poposa Phil.	Leafs	Herb	Pupusa	High Andes
Asteraceae (Compuesta)	Werneria	villosa A. Gray	Root flower	Herb	Hanku arme, hankowarmi, jankko warmi,	Puna Andes
Asteraceae (Compuesta)	Werneria c.f.	sp.	Leaf, root	Herb	Hanko, hanko verbena, verva	Puna Andes
Asteraceae (Compuesta)	Werneria c.f.	sp.	Roots	Herb	Maranzella macho	Puna Andes

Asteraceae (Compositae)	Xanthium	spinosa L.	Vegetative parts	Herb	Amorseco, anuch'api, mani-quipu, Cho'que ch'api	Andes
Balanophoraceae	Ombrophytum	subterraneum (Aspl.) B. Hansen	Seed, Root	Root, Parasitic	Anqannoqui	Puna Andes
Betulaceae	Alnus	serrulata (Aiton) Willd.	leaf stem	Herb	Abedui	
Bignoniaceae	Tecoma	sp.	Flower, branch leaf	Bush	Saw saw	
Boraginaceae	Borago	officinalis L.	Vegetative parts	Herb	Borage	Valley
Brassicaceae	Brassica	c.f rapa L.	Vegetative parts	Herb	Mostaza	
Brassicaceae	Lepidium	meyenii Walp.	Root tubor	Root crop	Maca, salvia	Andes
Brassicaceae (Cruciferaeae)	Descurainia	myriophylla (Willd. ex DC.) R.E. Fr.	Seed stem	Bush	Rintel romero	Puna Andes
Brassicaceae (Cruciferaeae)	Lepidium	cf. bipinnatifidum Desv.	Vegetative parts	Herb	Anuk'ara	
Brassicaceae (Cruciferaeae)	Matthiola	incana (L.) W. T. Aiton	Vegetative parts	Herb	Aleli	Valley
Bromeliaceae	Puya	sp.	Resin	Tree	Algarrobo, espino	Lowland
Bromeliaceae	Tillandsia	capillaris Ruiz & Pav.	Leaf, flower	Bush		
Burseraceae	Protium	c.f montanum Swart	Resin	Tree	Copal	Lowland
Burseraceae	Protium	Montanum Swart.	Resin	Tree	Copal, kopal	Lowland
Cactaceae	Echinopsis	lageniformis (Forster) H. Friedrich & G.D.	Vegetative parts	Cactus	Achuma, achun, San Pedro	Puna Andes
Cactaceae	Opuntia	c.f armata Backeb.	Vegetative parts	Cactus	Jala jala rojo	Valley
Cactaceae	Opuntia	c.f soehrensii Britton & Rose	Vegetative parts	Cactus	Jala jala blanco	Valley
Cactaceae	Opuntia	ficus-indica (L.) P. Miller	Vegetative parts	Cactus	Penca, tuna	
Cactaceae	Opuntia	orurensis Cardenas	Vegetative parts	Cactus	Boladora	Lowland
Cactaceae	Opuntia	soehrensii Britton & Rose	Seed	Cactus	Ayrampu, Airampu, espino	Puna Andes
Cactaceae	Opuntia	tunicata Hort. Berol. Ex Pfeiff	Vegetative parts	Cactus	Jala jala blanco	Valley
Cactaceae c.f	Caesalpinia	spinosa (Molina) Kuntze	Root tubor	Root crop	Amanaqa , patata	Andes
Caesalpiniaeae (Leguminosae)	Copaifera	reticulata Ducke	Seed pod	Vine	Tara	
Caesalpiniaeae (Leguminosae)	Copaifera	reticulata Ducke		Tree	Copaigo	Lowland
Caprifoliaceae	Sambucus	peruviana Kunth	Leaf	Tree	Sauco, khoja	
Caryophyllaceae	Dianthus	plumarius L.	Flower	Bush	Clavel, clavel rojo, clavel blanco, clavilina	Valley
Caryophyllaceae	Dianthus	caryophyllus L.	Flower	Bush	Clavel, clavel blanco	Valley
Caryophyllaceae	Pycnophyllum	tetrastichum Remy	Root flower	Herb	Rok'e, L'opana, c'opana,	
Celastraceae	Maytenus	ilicifolia Mart. Ex Reissek	Leaf	Herb	Diente de leon, llave	Andes
Characeae	Chara	sp.	Stalks, leafs	Herb	Lago tiporina	
Chenopodiaceae	Atriplex	rusbyi Britton ex Rusby	Stem, leaf, seed	Herb		
Chenopodiaceae	Chenopodium	ambrosioides L.	Stem, seed	Herb	Payko, paico, paikko	Andes
Chenopodiaceae	Chenopodium	incisum Poir.	leaf stem	Herb	Kita payko, serikinka,	
Chenopodiaceae	Chenopodium	quinoa Willd. Ssp. Milleaenum Aellen	Seed	Herb	Ahara, ajara	Puna Andes
Cyperaceae	Cyperaceae	sp.	Root	Tree	Trinchadora (macho)	Lowland
Cyperaceae	Cyperaceae	sp.	Root	Tree	Trinchadora	Lowland
Clusiaceae	Clusia	cf. lechleri Rusgby	Resin	Tree	Incienso	Low valley
Clusiaceae	Clusia	pachamamae Zenteno & A. Fuentes	Resin	Tree	Incienso, viste avaru	Low valley
Compuesta	Amburanan	sianensis*	Leaf, flower	Tree	Tifonsia	
Crassulaceae	Aeonium	arborescens (L.) Webb & Berthel	Leaf, flower	Tree		
Cucurbitaceae	Cyclanthera	sp.	Seed	Tree	Achoche, achojcha	
Cupressaceae	Cupressus	sargentii Jeps.	Resin	Tree	Pino	
Curubitaceae	Fevillea	cordifolia L.	Seed bean	Vine	habilla, avilla,	
Cyatheaceae	Alsophila	cuspidata (kunze) D.S. Conant.	Branch	Tree	Yanamacho	
Cyatheaceae	Cyathea	c.f pungens (willd.)	Trunk	Tree	El hecho, (Lowland name: Yana macho)	Low valley
Cypress	Cyperaceae	sp.	Root	Tree	Trinchadora	Low valley
Ephedraceae	Ephedra	rupestris Benth.	Herb	Herb	Sanu sanu	
Ephedraceae	Ephedra	americana Humb. & Bonpl. ex Willd.	Leaf, flower	Herb	Sano sano, cola de caballo, cola de caballo hembra, cola de caballo macho	Valley
Equisetaceae	Equisetum	giganteum L.	Stems	Herb		
Erythroxyloaceae	Erythroxyllum	coca Lam.		Bush	Coca	Low valley
Euphorbiaceae	Croton	lechleri Mull. Arg	Resin	Tree	Sangre de grado, sangre de dragon, sangre tuyo	Lowland
Euphorbiaceae	Euphorbia	sp.	Root tubor	Root crop	Root tubour	
Euphorbiaceae	Jatropha	curcas L.	Seed	Tree	Chua chua, pinon	Lowland
Euphorbiaceae	Ricinus	communis L.	Bean	Tree	Pinon	
Fabaceae	Acacia	aroma	Wood, branch	Tree	Tusca	Lowland
Fabaceae	Astragalus	c.f garbancillo Cav.	Seed	Tree	Garbanzo	
Fabaceae (Leg. Papilionodeae)	Adesmia	miraflorensis Remy	Vegetative parts	Bush	Espino	
Fabaceae (Leg. Papilionodeae)	Lupinus	c.f altimontanus C.P. Sm.	Flower	Herb	Shaykari	
Fabaceae (Leg. Papilionodeae)	Lupinus	sp.	Leaf, stem	Herb	Ruda blanca, K'ela	Andes
Fabaceae (Leg. Papilionodeae)	Myroxylon	balsamum	Bark	Tree	Chuchuhuasi chuchuwasi, quina quina, (local lowland names: chuchuhuaso, Guapomo, resina, balsama)	Lowland
Fabaceae (Leg. Papilionodeae)	Myroxylon	balsamum (L.) Harms	Seed, Bark	Tree	Quina, kina kina, quina quina	Lowland
Fabaceae (Leg. Papilionodeae)	Medicago	sativa L.	Leaf	Herb	Alfa, alfalfa	Valley
Fabaceae (Leg. Papilionodeae)	Spartium	junceum L.	Vegetative parts	Tree	Retama, ritama	Andes
Fabaceae (Leg. Papilionodeae)	Vicia	faba L.	Seed	Vine	Haba	

Fabaceae (Leg. Mimosoideae)	Inga	sp.	Seed pod	Tree	Pepa de pakay	
Fabaceae (Leg. Caesalpinjiaceae)	Hymenaea	courbaril L.	Seedpod	Tree	Alto wayaca, resin, Copal	Low valley
Fabaceae (Leg. Mimosaceae)	Adesmia	spinossissima Meyen ex Vogel	Fruit	Herb	Anahuaya, kayni, choque kana	Andes
Fabaceae (Leg. Mimosaceae)	Anadenanthera	colubrina (Vell.) Brenan	Seed	Tree	Chipi, Wilca, Willka, (Local lowland names: Cebil, Curupau, Bilca, Curapari)	Lowland
Fabaceae (Leg. Mimosaceae)	Otholobium	glandulosum (L.) J. W. Grimes	Leaf, branch, flower	Herb	Wallekalla, wajaka, Walke (wajke), wallakaya, Bilia	
Fabaceae (Leg. Mimosaceae)	Proposis	c.f flexosa, alba Griseb (chilensis (mol.) Stuntz mas arcado)	Seed pod	Tree	Tajhho, algarrobo	
Fabaceae (Leg. Papilionodeae)	Canavalia	eurycarpa Piper aff.	Seed	Tree	Avilla	Lowland
Fabaceae (Leg. Papilionodeae)	Canavalia or Mucuna		Seed	Tree	Avilla para ninos, habilla sp.	Lowland
Fabaceae (Leg.)	Myroxylon	balsamum (L.) Harms	Resin	Tree	Myrrh, incienso negro, copal negro, Balsamo de Peru	Low valley
Fabaceae (Leg.)	Phaseolus	vulgaris L.	Bean	Vine	Chewi rojo, Chewi negra (red or black bean)	Andes
Fabaceae (Leg)	Ormosia	c.f Bolivarensis (Rudd) C.H. Stirton	Seed	Tree	Wayruru	Lowland
Fabaceae (Leg)	Ormosia	Ormosia bolivarensis (Rudd) C.H. Stirton	Seed	Tree	Wayruru, Wairuro	Lowland
Fabaceae (Leg)	Ormosia	sp.	Seed	Tree		
Fabaceae (Leg)	Ormosia	c.f amazonica Ducke.	Seed	Tree	Wayrur	Lowland
Fabaceae (Leg)	Otholobium	pubescens (Poir.) J.W. Grimes	Leaf, stem, flower	Herb	Walikia, Waykia, billia, wallakaya, Bilia Bilia	
Fabaceae (Leg)	Prosopis	kuntzei Harms.	Seed pod	Tree	Kap, tajho	
Fabaceae (Leg)	Prosopis	strombulifera (Lam.) Benth.	Seed, yellow spiral	Tree	Kuti waynito, kuti amarillo, K'urro, Miku Miku	Low valley
Fabaceae (Leg)	Prosopis	c.f laevigata (Humb. & Bonpl. ex Willd.) M.C. Johnst.	Branch, thorn	Tree	Tajho	
Fabaceae (Meliaceae)	Amburana	cearensis (Allemão) A.C. Sm.	Bark	Tree	Peni, chuchuwasi macho, Tommie, tume, robe	Lowland
Gentianaceae	Gentianella	c.f buchtienii (Gilg) T.N. Ho & S.W. Liu	Root, flower	Herb	Kata: root, Kata de tani tani, tani tani flower	High Andes
Gentianaceae	Gentianella	c.f buchtienii (Gilg) T.N. Ho & S.W. Liu	Flower, root	Herb	Tani tani (Flower), Kata (Root)	High Andes
Geraniaceae	Erodium	cicutarium (L.) L'Hér. ex Aiton	Leaf, stem, flower	Herb	Relloj reloj, agujilla, aguja aguja	Puna Andes
Geraniaceae	Pelargonium	hortorum L.H. Bailey	Leaf, flower	Herb	Geranium	Andes
Illiciaceae	Illicium	verum Hook.f.	Seed pod	Tree	Anis Estrella	Import
Juglandaceae	Juglans	boliviana (C. DC.) Dobe		Tree	Nogal	Low valley
Juglandaceae *12	Juglans	boliviana Dobe	Bark	Tree	Nogal negro	Low valley
Lamiaceae (Labiatae)	Lavandula	dentata L. c.f.	Vegetative parts	Herb	Lavanda	Valley
Lamiaceae (Labiatae)	Lavandula	officinalis Chaix	Flower	Herb	Lavanda, alucema	Valley
Lamiaceae (Labiatae)	Lepechinia	graveolens (Regel) Epling	Leaf, stem, flower	Herb	Attemisa, salvia	Andes
Lamiaceae (Labiatae)	Melissa	officinalis L.	Leaf, stem	Bush	Menta, toronjil	Valley
Lamiaceae (Labiatae)	Mentha	piperita L.	Vegetative parts	Herb	Hierba buena, menta	Andes
Lamiaceae (Labiatae)	Mentha	spicata L.	Vegetative parts	Herb	Hierba buena	Andes
Lamiaceae (Labiatae)	Minthostachys	c.f acutifolia Epling	Leaf, branch, flower	Bush	K'oa blanca, muna muna	Puna Andes
Lamiaceae (Labiatae)	Minthostachys	c.f. andina (Britton ex Rusby) Epling	Leaf, branch	Bush	K'oa, muna muna, k'oa blanca	Puna Andes
Lamiaceae (Labiatae)	Origanum	majorana L.	Vegetative parts	Herb	Mejorana dulce	Andes
Lamiaceae (Labiatae)	Rosmarinus	officinalis L.	Leaf branch	Bush	Romero	Andes
Lamiaceae (Labiatae)	Satureja	c.f boliviana (Benth.) Briq	Vegetative parts	Bush	Kh'oa, muna, K'oa (in La Paz), muna koa	Puna Andes
Lamiaceae (Labiatae)	Stachys	c.f pusilla (Wedd.) Briq.	Vegetative parts	Herb	Verbena	Andes
Lamiaceae (Labiatae)	Minthostachys	c.f mollis (Kunth) Griseb.	Branch, leaf, berry	Bush	Muna	Puna Andes
Lamiaceae (Labiatae)	Clinopodium	cf. bolivianum (Benth.) Kuntze cf. vanum (Epling) Harley & A. Granda	Leafs, branch	Bush	K'oa, muna muna, hami muna	Puna Andes
Lamiaceae (Labiatae)	Clinopodium	pallidum (Epling) Govaerts	Leaf, branch, flower	Bush	K'oa roja	Puna Andes
Lamiaceae (Labiatae)	Clinopodium	sp.	Leaf, branch flower	Bush	K'oa, wira K'oa	Puna Andes
Lamiaceae (Labiatae)	Salvia	haenkei Benth.	Leaf, flower	Herb	Chimi chimi	
Lamiaceae (Labiatae)	Salvia	officinalis L.	Vegetative parts	Herb	Salvia	Andes
Lauraceae	Cinnamomum	verum J. Presl	Bark	Tree	Canela	Import
Lichen family uncertain	c.f Parmelia Thamnoia	sp. vermicularis (Sw.) Ach. Ex Schaerer*	Lichen	Lichen	Cala chiaj Wary punka, wari kunka, Upa Upa, wupa upa	Andes
Lichen: Parmeliaceae	parmelia	sp.	Lichen	Lichen	Romi chunka, verde cora,	
Liliaceae			Root	Herb	Contra, tres contras root	Puna Andes
Linaceae	Linum	usitatissimum L.	Seed	Herb	Linaza	
Loasaceae	Cajophora	c.f. chuquitensis (Meyen) Urb. & Gilg	Flower	Herb	Itapillu, pica pica	Valley
Loganiaceae (Buddleiaceae)	Buddleja	c.f. tucumanensis Griseb. (sp. No es coriacea.)	Leaf, flower	Tree	Kiswara, kimsa kucho, quimsa K'juchu, Karkeja	
Loganiaceae (Buddleiaceae)	Buddleja	c.f. coriacea Remy	leaf flower	Tree	Kiswara, (quishuara), kiswara macho	Puna Andes
Loranthaceae	Tripodanthus	acutifolius (Ruiz & Pav.) Tiegh.	Leafs, branch, flower, fruit	Parasitic vine	Llave llave, jamillo, Jamillu, llave, Hamillu,	Low valley
Loranthaceae	Ligaria	cuneifolia (Ruiz & Pav.) Tiegh.	Leaf, branch, fruit, flower	Parasitic vine	Llave, jamillo, hamillo,	Low valley

Lycopodiaceae	Huperzia	saurourus (Lam.) Trevis	Leaf, branch	Tree	Macho macho, macha macha, Tura tura,	
Malvaceae	Malva	parviflora L.	Leaf, seed	Herb	Malva	Andes
Malvaceae	Nototriche	c.f. flabellata (Webb.) A. W. Hill	Flower petals	Herb	Flor de mantaina (flower), hembra (flower), Hanca (flower) P'acha curura (root & plant), Pacha curwa (root & plant)	Puna Andes
Malvaceae	Nototriche	c.f. pulverulenta B.L. Burt & A.W. Hill	Flower	Herb	Flor de tarco	High Andes
Malvaceae	Nototriche	sp.	Root	Herb	Anti curucu, pacha cururu,	High Andes
Malvaceae	Nototriche	azorella Hill (dryadifolia Solms Krap)	Vegetative parts	Herb	Alti, al tia, altea	High Andes
Malvaceae	Tarasa	tenella (Cav.) Krapov.	Root	Herb	Koro, (kora)	
Mimosaceae	Calliandra	c.f. trinerivia Benth.	Leaf	Herb	Pata de cabra	
Monimiaceae	Peumus	boldus Molina	Leaf branch	Bush	Boldo	Valley
Monocot	Iridaceae		Vegetative parts	Herb	Maranzella hembra	Puna Andes
Moraceae	c.f. Dorstenia	brasiliensis*	Root	Herb	Sapirada	
Moraceae	Ficus	carica L.	Leaf	Tree	Higo, hoja de higo	Low valley
Mushroom, fungus			Root tubor	Herb	Korak liki	
c.f.						
Multiple sp.	Multiple sp.	Multiple sp.		Multiple	Caka de hormiga, chaka wana	Puna Andes
Myristicaceae	Myristica	fragrans Hoult	Nut	Tree	Nuez moscada, amosmoscada	
Myrtaceae	Eucalyptus	globulus Labill.	Leaf, branch	Tree	Eucalipto blanco, (young leaves), eucalipto, iucalipto	Andes
Myrtaceae	Eucalyptus	sp. (c.f glob.)	Leaf, branch	Tree	Eucalipto rojo	Andes
Myrtaceae	Myrcianthes	osteomeloides (Rusby) McVaugh	Leaf	Bush	Arayan	Valley
Myrtaceae	Myrtus	communis L.	Vegetative parts	Bush	Arrayan	Valley
Myrtaceae	Syzygium	aromaticum (L.) Merr. et Perry	Clove	Tree	Clavo de olor	Andes
Onagraceae	Oenothera	sp.	whole plant	Herb	Maranzella	Puna Andes
Onagraceae	Oenothera	nana Griseb.	Vegetative parts	Herb		
Onagraceae	Oenothera	punae Kuntze	Leaf root	Herb	Nina nina	
Orchidaceae c.f	Maxillaria	sp. (2 possible sp.)	Stem, tubor	Herb	Maranzella del valle	Valley
Orchidaceae c.f			Stem tubor	Herb	Maranzella, raiz valeriana, del valle	Puna Andes
Orchidaceae*		sp.	Seed	Parasitic herb		
Oxalidaceae	Hypseocharis	c.f. pimpinellifolia J. Remy	Root tubor	Herb	Wachanka	Andes
Papaveraceae	Argemone	subfusiformis G.B. Ownbey	Leaf	Herb		
Papaveraceae	Bocconia	cf integrifolia Bonpl.	Leaf	Tree	Amaraiça, amakari	
Papaveraceae	Bocconia	Frutescens L.	seed	Tree	De yanana	Lowland
Papaveraceae	Bocconia	integrifolia Bonpl.	Seed	T	Yanana, yanala	Lowland
Passifloraceae	Passiflora	mollissima (Kunth) L.H. Bailey	Flower	Tree	Tumba, tumbo	Valley
Passifloraceae (Leg. Caesalpiniaceae)	Tamarindus	indica L.	Resin	Herb	Tamarina, aco sapaya	
Phytolaccaceae	Gallesia	integrifolia (Spreng.) Harms	Trunk	Tree	Arbol de ajo, ajo de monte	Lowland
Piperaceae	Piper	c.f perscabrifolium Yunck.	Leaf, seed	Herb	Matico, Matico matico, Matico rojo, matico macho	Low valley
Piperaceae	Piper	elongatum Vahl.	Leaf	Herb	Matico, matico hembra, Matico rojo	Low valley
Piperaceae	Piper	sp.	Leaf	Herb	Matico (de Peru)	Low valley
Plantaginaceae	Plantago	c.f elongatum Hegetschw. (or lanceolata)	Whole plant	Herb	llanten	Andes
Plantaginaceae	Plantago	major L.	Vegetative parts	Herb	Llanten, llantina	Andes
Plantaginaceae	Plantago	c.f lanceolata L.	Plant	Herb	Macho, llanten macho	
Poaceae	Bromus	catharticus Vahl	Seed	Grass	Cebadilla	Andes
Poaceae	Bromus	catharticus Vahl	Leaf	Grass	Cebado, cebadilla	Andes
Poaceae	Cymbopogon	citratrus (DC.) Stapf.	Leaf	Herb	Hierba luisa	Andes
Poaceae	Festuca	orthophylla Pilg.	Leaf, root	Grass		
Poaceae	Zea	maiz var.	Kern	Grass crop	Kuti maiz	Andes
Polemoniaceae	Cantua	buxifolia Juss. ex Lam.	Flower	Tree	Kantuta	Puna Andes
Polygonaceae			Root	Bush	Kenha, raiz de kenha, Zarzaparilla,	
Polygonaceae	Rumex	crispus L.	Leaf, flower	Herb	Kentu	
Polygonaceae	Rumex	cuneifolius Campd.	Leaf	Herb	Rompe piedra, k'entu	
Polygonaceae	Rumex	sp.	Root	Herb	Zarzaparilla del altiplano	Altiplano
Polygonaceae	Triplaris	americana L.	Wood	Tree	Palo Santo	Lowland
Polyodiaceae	Polypodium	chrysolepis Hook.	Vine	Vine		
Polyodiaceae.	Nipidium	albo punctatissimum Lellinger	Vegetative parts	Herb	Kalawala, calawala	
Polyodiaceae.	Phlebodium	decumanum J.Sm.	Branch	Vine	Cola de mono	Lowland
Rosaceae	c.f Kageneckia	lanceolata Ruiz & Pav.	Branch, bark	Tree	Yoke	Valley lowland
Rosaceae	Lachemilla	pinnata (Ruiz & Pav.) Rothm.	Leaf, root	Herb	Sillu sillu	Andes
Rosaceae	Lachemilla	sp. (not pinnata)	Flower leaf	Herb	pimpinina, pimpinina	
Rosaceae	Polylepis	c.f besserii Hieron	Branch leaf	Tree	Quenua, kenua chapi	
Rosaceae	Rosa	sp.	Leaf, branch, flower	Herb	Rosa, chapi rosa	Andes
Rosaceae	Rubus	boliviensis Focke	Berries, leaf, branch	Herb	Kari kari, khari khari	
Rosaceae	Rubus	c.f megalococcus Focke	Fruit	Bush	Kari kari; khari khari	
Rosaceae	Tetraglochin	c.f cristata	Leaf, branch	Bush	Kayni (Chapi), kanilla	
Rubiaceae	Coffea	arabica L.	Seed case	Bush	Café, cascara de café, Sultana	Low valley
Rubiaceae	Relbunium	sp.	Seed	Herb	Chapi, chape	
Rubiaceae	Uncaria	guianensis (c.f tomentosa)	Bark	Tree	Una de gato	Lowland
Rubiaceae	Uncaria	tomentosa DC. (c.f guianensis (Aubl.) J.F. Gmel)	Bark	Tree	Una de gato	Lowland
Rutaceae	Citrus	aurantium L.	Flower	Tree	Flor de azar, naranja	Low valley
Rutaceae	Citrus	medica L.	Fruit	Tree	Sidra	Low valley
Rutaceae	Ruta	cf. graveolens L.	Leaf, flower	Herb	Ruda	Andes
Rutaceae	Zanthoxylum	coco Gillies ex Hook. & Arn.	Vegetative parts	Tree	Suaco	
Sapindaceae	Dodonaea	viscosa Jacq.	Leafs, flower	Herb	Chakatilla, chakhatava, chakhataya,	Puna Andes
Sapindaceae	Sapindus	saponaria L.	Seed, nut	Tree	Negra cabeza, (Local lowland names: Arbol de jabon sululo)	Lowland

Schoepfiaceae	Quinchamalium	chilense Molina	Leafs	Bush	Maliska, chapi, kinchamali, kincha malo, mali -mali,	
Scrophulariaceae	Calceolaria	c.f. parvifolia Wedd.	Flower	Bush	Zapatilla	Andes
Scrophulariaceae	Calceolaria	mexicana c.f. buchtieniana Kraenzl.	Whole plant	Herb	Uma zapatilla	Puna Andes
Scrophulariaceae	Calceolaria		Leaf, branch	Bush	Romercito, amay sapatu, zapato- zapato	
Scrophulariaceae	Calceolaria	plectranthifolia Walp.	Leaf, flower	Herb	Zapatilla, yapatilla, yuca zapatilla	Andes
Scrophulariaceae	Agalinis	lanceolata (Ruiz & Pav.) D'Arcy	leaf, twig	Herb	Mankap'aki	
Senecio	phylloleptus	sp.	Leaf, branch, flower	Bush	Peñas akana, pinas akana, chachakoma macho	
Smilacaceae	Smilax	sp.	Root	Herb	Cristal a al china	Low valley
Smilacaceae	Smilax	sp.	Leaf, flower	Herb	Yuca zapatillo	Andes
Smilacaceae	Smilax	sp.	Root tubor	Herb	Zarzaparilla amarillo verde	Valley
Smilacaceae	Smilax	sp.	Roots	Herb	Zarzaparilla, wila layu	Low valley
Smilacaceae	Smilax	sp.	Root tubour	Herb	Zarzaparilla, zarzaparilla amarillo	Low valley
Smilacaceae	Smilax	sp.	Root	Herb	Zarzaparilla, zarzaparilla blanco	Low valley
Smilacaceae	Smilax	sp.	Root tubor	Herb	zarzaparillo rojo	Low valley
Smilacaceae	Smilax	sp.	Root tubor	Herb	zarzaparilla rojo	Low valley
Solanaceae	Brugmansia	sanguinea (Ruiz & Pav.) D. Don	Flower	Tree	Floripondi, flurifundio	Low valley
Solanaceae	Brugmansia	arborea (L.) Lagerh.	Flower	Tree	Floripondi	Low valley
Solanaceae	Cestrum	cf parqui L'Hér.	Leaf, branch, flower	Tree	Sapi warmi,	
Solanaceae	Cestrum	parqui L'Hér.	Leafs, branch	Bush	Andres huaylla, Chua chua, andres waya, andres wailla	Andes
Solanaceae	Dunalia	brachyacantha Miers	Vegetative parts	Bush	Espino	
Solanaceae	Fabiana	densa Remy	Plant	Bush	Tara tara, lena de ananayi, Amamaya, kita romero	
Solanaceae	Lycianthes	lycioides Hassl.	Branch	Herb		
Solanaceae	Nicotiana	undulata Ruiz & Pav.	Vegetative parts	Tree	Tuska tuska	
Solanaceae	Solanum	marginatum L. f.	Leaf, branch, fruit	Tree	Cardo Santo, cardo Maria	Andes
Solanaceae	Solanum	nitidum Ruiz & Pav.	Leaf, stem, flower	Bush		
Solanaceae	Solanum	paitans C.V. Morton	Seed	Tree	Kuti kuti	
Solanaceae	Solanum	sp.	Seed, leaf, stalk	Herb	Nocha	
Solanaceae	Solanum	sp.	Whole plant	Tree		
Solanaceae	Solanum	tripartitum Dunal	Leaf, stem, flower	Tree	kuti kuti, ochon qora	
Solanaceae	Solanum	tuberosum L.	Root, dust	Root crop	almidon de papa luki	High Andes
Sterculiaceae	Sterulia	apetala (Jacq.) H.Karst	Seed pod	Tree	Avilla, habilla, (Local name Lowland S. Cruz: Ojo de toro)	Lowland
Sterculiaceae	Guazuma	ulmifolia Lam (.var. ?)*	Nut	Tree	Churco (brown)	Lowland
(Malvaceae)	Guazuma	ulmifolia Lam (c.f var.)*	Seed pod	Tree	Churco (black)	Lowland
(Malvaceae)	Guazuma	ulmifolia Lam (c.f var.)*	Seed pod	Tree	Churco (black)	Lowland
Sterculiaceae c.f	c.f Pouteria	sp.	Seed	Tree	Avila	Low valley
Tropaeolaceae	Tropaeolum	tuberosum Ruiz & Pav	Root tubor	Root crop	Isano negro, isano kebranon, Isano, Pajarilla	Andes
Urticaceae	Urtica	urens L.	Leaf, branch, seed	Herb	Itapallu, ortiga	Andes
Valerianaceae	Valeriana	micropterina Wedd.	Root leaves	Herb	Valeriana, K'ata (macho)	Andes
Valerianaceae	Valeriana	nivalis Wedd.	Root leaves	Herb	K'ata (hembra)	Andes
Valerianaceae*	Valeriana	nivalis Wedd.	root leaves	Herb	Khata, valeriana	
Verbenaceae	Aloysia	sp.	Leaf, branch, flower	Bush	Toronjil	Andes
Verbenaceae	Aloysia	triphylla Royle	Leaf, branch, seed	Tree	Cedron	Valley
Verbenaceae	Junellia	minima (Meyen) Moldenke	Vegetative parts	Herb	Hanki, pampa llareta	Puna Andes
Verbenaceae	Junellia	seriphoides (Gillies & Hook.) Moldenke	Leaf branch	Herb	Amkaraya, tonkoraya	
Verbenaceae	Lampaya	castellani Moldenke	Leaf, branch	Bush	Lampaya (macho), Lampaya	Puna Andes
Viscaceae	Dendrophthora	basiandra Kujit	Leaf, branch	Tree	Solda que solda, muerdago, suelta que suelta, suelta que suelta,	Low valley
Viscaceae	Phoradendron	trianae Eichler	Leafs, fruit	Parasitic vine	Solda que solda, sulta que sulta,	Low valley
Zingiberaceae	Zingiber	officinale Roscoe	Root	Herb	Ginger, gengibre	Valley
Zingiberaceae	Zingiber	officinale Roscoe	Seed	Herb	Abilla	Lowland
Zingiberaceae	Zingiber	officinale Roscoe	Root	Root crop	Alco sapyayo	Puna Andes
Zingiberaceae	Zingiber	officinale Roscoe	Root	Herb	Ancuela, zarzaparilla	Puna Andes
Zingiberaceae	Zingiber	officinale Roscoe	Seed	Tree	Chamicuy	
Zingiberaceae	Zingiber	officinale Roscoe	Whole plant	Bush	Chapi blanco,	
Zingiberaceae	Zingiber	officinale Roscoe	Bark	Tree	Chirca	
Zingiberaceae	Zingiber	officinale Roscoe	Bark	Tree	Chuchuwasí hembra	Lowland
Zingiberaceae	Zingiber	officinale Roscoe	Root tubor	Herb	Chum chullu	
Zingiberaceae	Zingiber	officinale Roscoe	Root tubor	Herb	Chunu chuno	
Zingiberaceae	Zingiber	officinale Roscoe	Resin	Herb	Cola macha	
Zingiberaceae	Zingiber	officinale Roscoe	Root	Herb	Copana (plant and root), wari wari (root)	
Zingiberaceae	Zingiber	officinale Roscoe	branch	Tree	Curon	
Zingiberaceae	Zingiber	officinale Roscoe	Leaf	Herb	Curu cura	
Zingiberaceae	Zingiber	officinale Roscoe	Root	Herb	Curur asmara	
Zingiberaceae	Zingiber	officinale Roscoe	Resin	Tree	Goma, goma Peruano	Low valley
Zingiberaceae	Zingiber	officinale Roscoe	wood	Tree	Gusanito	
Zingiberaceae	Zingiber	officinale Roscoe	Leaf branch	Bush	Hoja de la vida	
Zingiberaceae	Zingiber	officinale Roscoe	Root	Herb	Hypa soltaki, jallpa sultaki	
Zingiberaceae	Zingiber	officinale Roscoe	Branch leaf	Herb	Itapallu	
Zingiberaceae	Zingiber	officinale Roscoe	Fruit	Bush	Llave	Low valley
Zingiberaceae	Zingiber	officinale Roscoe	Fruit	Bush	Llave red	Low valley
Zingiberaceae	Zingiber	officinale Roscoe	Leaf	Cactus	Magje	
Zingiberaceae	Zingiber	officinale Roscoe	leaf stem	Tree	Mangay	
Zingiberaceae	Zingiber	officinale Roscoe	Flower	Herb	Pensamiento	

Seed pod	Tree	Poró	
Bark	Tree	Quenhua casiollea, tipa	
Root	Herb	Raiz de kenha	
Resin	Tree	Resina	
Branch	Bush	Sacha	Low valley
Flower	Herb	Sucu tolemi	
Seed bean	Tree	Tartajo	
Leaf	Bush	Te Chino	
Leaf, stem, flower	Herb	Tian tia, hiyan tia	
	Tree	Tipa	Lowland
Root	Herb	Tuna kuru, eustakia	
Leaf	Root crop	Uma papa	
Whole, mushroom	Herb	Urak liki, katha, kakta	
Branch	Tree	Urona	
Root trunk	Bush	Uruso	
Vegetative parts	Herb	Verbena	Andes
Leaf, stem	Herb	Wila wila, chuchua	
Root	Bush	Willalayu	
Leaf	Herb	Wina wina (de Peru), wira wira	Peru
Leaf, stem	Herb	Yerba mate	

KEY

*** classification derived from ethnobotanic record of the common name

Appendix 2

Wholesale Distribution of Medicinal Plants at the Annual Markets of Oruro

Annual feria of Huari: Southern Altiplano					
Ecological Region	Market Region collected from	Folk species (plants and processed products)	Total number of folk species for the region	Annual feria plants are distributed from	Supplier to Andean feria / region supplier is from
Lowland Southern dry	Aquile (2)	Yanala, Pinon, Quina, Habilla, Chipi (Willka), Wajie, Thajo, Chasca margarita, Quina quina, Negro cabeza, Kuti,	11	Huari	Wholesale / Cochabamba
Puna high,	Oruro Condo surrounding Ayllus (1) (southern Azanazques)	Pupusa, Sasawi, Marancela, Altea, Qaata (Kaata), Chachacoma, Urpa apa, Pachajkururu,	8	Huari	Communal collector / Condo and south western altiplano
Altiplano, south (predominate)	Pampa allaguas (1,2)	Choque kanalla (2), Lampaya (2), Anqhanoque (2), Jaque masi (2), Negro masi (2), Lampaso (1)	4 (2 mineral)	Huari	Communal collector / Condo
Altiplano south lake	Lago poopo (1, 2)	Churus (2)	1	Huari	Communal collector / Condo
Altiplano	Illaja (2)	Muna (2)	1	Huari	Communal collector / Condo
Altiplano	Qalawiri (2)	Wira wira (2)	1	Huari	Communal collector / Condo
Altiplano	Pap'ujio (2)	Sacha (2)	1	Huari	Communal collector / Condo
Altiplano south	Salinas Garica Mendoza (2)	Chaqeri (2)	1	Huari	Communal collector / Condo
Altiplano south	Pocoata y Mach, lado de Potosi (2)	Yunque piedra blanco, Amarillo, negro (2) (coloured plant)	1	Huari	Communal collector / Condo
Altiplano Southern	Huari depart. (1)	Airampu (1)	1	Huari	Individuals from villages of southern Andes

Altiplano southern Condo Place of production	Prepared by Condenas (1, 2)	Contras 3 coloured (2) Altia root	1	Huari	Communal collector / Condo
Andean Wide range	Potosi (1,2)	Romero (2)	1	Huari	Condo cultivator
Altiplano Southern	Challapata (1)	Jarma (2)	(Mixture)	Huari	Producer & wholesale
Lowland Southern		Chipi, wayruru,	2	Huari	Merchant / Valley
Altiplano southern western Chile strip, Sajama	North western Oruro Sajama (1)	Wira K'oa, (1) caca avestruz (2),	2	Huari	Collector / communal western altiplano
Pacific coast	Pacific coast to Andes (1)	Estrella mar macho hembra (1),	(2 sea)	Huari	Collector / community from Oruro – chile border region
Altiplano Southern	Oruro city (1, 2)	Misterio (2)	(Man made)	Huari	Producer / Oruro city
Altiplano	(1)	Zarzaparilla del Altiplano (2)	1	Huari	Collector / condo
			Huari Total 37		

Annual <i>Feria</i> of Oruro city and Caracollo: Central Altiplano					
Northern Altiplano upper valleys	La Paz, ciudad north eastern slopes	Achuma, sinonimous San Pedro (2) (Dry slices)	1	Huari, Caracollo,	Producer community / La Paz
Mid high valley Yungas, North to Central, Cochabamba, la Paz	Inquisivi, Caranavi, (1)	Kalawala, Raiz de china, Llave, Matico, Cola de caballo, Carlo Santo, Retama, Muerdago, Zarzaparilla (1) (3 types)	9	Feria Norte, Caracollo	Collector communal / Central valley Cochabamba, La Paz
Valley mid	Lado de Potosi (2)	Hoja de higo	1	Caracollo	Merchants with fruits / valley
Valley mid Yungas north	Lado de Yungas (2)	Kuru	1	Feria Norte	Prepared by Condo campesino who buy from yungenos
Valley Yungas north	Lado de Yungas (2)	Contra root fresh	1	Feria Norte	Prepared by Condenas campesino buy form yungenos supply to Huari

High Valley yungas mid to north	Cochabamba Caranvi, Inquisivi to La Paz (1)	Zarzaparilla, three colours yungas (1)	1	Feria Norte, Ramos	Collector / wholesale
Low hot, middle	Cochabamba, santa cruz (1)	Sultakisulta (2) also sinonimo Muerdeago, Jamillo (1) Round fruit big citrus (1)	1	Feria Norte	Collector Ma
Low mid, hot central region (1)	Caranvi Inquisivi below (1)	Flor Blanca (1) Suelda que suelda (1) Aragana (1) Hoja de la vida (1) Sangretorio (1) Espina sinonima llave espina, chapi llave, diente de leon (tall) (1) Quinsa quchu sinonimous Carkija, Uri Uri (1) Kari kari (1)		Feria Norte Caracollo (1)	Collector Ma from Inquisive and Caranvi (1) (Sangretorio entregamos to Naturistas caracollo)
High valley North high valley Yungas La Paz	Road to Beni (1)	Helecho (1),	1	Caracollo feria norte, Ramos	Naturistas, sector in Feria norte
Altiplano south	Oruro central southern dry flats (1)	Lampaya (1), choque cana (1), Phasa (1)	2	Feria norte (phasa), Huari	Communal
High valley mid to north	Cochabamba higher region next to Oruro, Tacopaya	Andres waya (1) Chanka piedra (1) Espina sinonima llave espina, chapi llave, diente de leon (tall) (1) Sabilla (1) Mankapaki (1)		Feria norte Caracollo	
			Total Feria del Norte / Caracollo 31		

Annual <i>feria</i> of Viacha: Northern Altiplano					
South cordillera Andes Puna 4,000 up	Western North Oruro Sajama (1)	K'oa Kille (1) Roots nototriche Other plants	3	Viacha	Collector, communal
La Paz yungas	North yungas high valley (1)	Matico (1)	1	Viacha	Collector Ma
			Total Viacha 4		
Total No. Species sold wholesale at Andean <i>Feria</i>					
73					

Key: (1) Data collected by P. Wilkin 2005, 6 & 7.
(2) Data corresponds with Alba (1987) survey of Huari.

Appendix 3 Ingredients Used for the *Mesa Negra* Mixture

Ingredient folk name	Plant part	Wholesale distribution	Source region	Distribution and region of abundance in Bolivia
Negro cabeza	Seed	Huari	Quime	Central north lowland
Cuti Huaynito	Seed	Huari	Quime	Lowland
Churko 1 (Black)	Seed	Huari	Quime	Lowland
Churko 2 (café)	Seed	Huari	Quime	Lowland
Wayrurito	Seed	Huari	Quime	Lowland
Wayruito (Hembra)	Seed	Huari	Quime	North central lowland
Tajo negro	Seed	Huari	Quime	Central southern lowland
Espinoso	Spike	Huari	Quime	Central Lowland
Habilla hembra	Seed	Huari	Quime	Lowland
Habilla macho	Seed	Huari	Quime	Lowland
Chaska margarita	Seed	Huari	Quime	Lowland
Tojlos (Calaverita)	Seed	Huari	Quime	North central lowland
Harma	Mixture		Carcollo	Southern Altiplano
Chipi	Seed	Huari	Quime	Lowland
Yanala	Seed	Huari	Quime	Lowland
Alqo zapallo	Root	Huari	Quime	Lowland northern
3 Los contras	Root	Huari	Altiplano south	Altiplano
Kata	Root	Viacha	Altiplano south	High Andes
Hoja de Llave	Leaf	Feria Norte	Quime middle	North central Valley and lowland
Achuma	Cactus slice	Huari	North La Paz	Northern Altiplano
Waje	Bark	Huari	Valley	Central lowland
Macha macha	Leaf	Huari	Quime	Central northern lowland
Sacha		Huari	Quime	Central northern lowland
Quina	Bark chip	Huari	Quime	Central northern lowland
Quina quina	Seed	Huari	Quime	Central lowland
Azufre	Mineral	Huari	Southern Altiplano	Altiplano
Kuti Maiz	Kernel	Oruro	Valley central	Central to southern Valley
Jala jala macho	Cactus	Huari	Valley south	Southern lowland
Jala jala hembra	Cactus	Oruro	Valley south	Southern lowland
Pluma de yaca yaca	Bird feather	Markets	Altiplano	Altiplano
Pupusa	Leaf	Huari	Altiplano south	High moist Andes
Retama (Optional)	Flower		Andes	Andes
Caracollos fresh				
Yunque	Unidentified	Huari	Southern Altiplano	Southern Altiplano
Ajo macho	Tubor	All market	Altiplano	Andes
Estrella de mar Hembra	Star fish	Huari	Chile Iquique	Pacific
Estrella de mar Macho	Star fish	Huari	Chile Iquique	Pacific
Altia	Root	Huari	Altiplano	Altiplano
Jaque mase blanco	Unidentified	Huari	Southern Altiplano	Southern Altiplano
Jaque mase negro	Unidentified	Huari	Southern Altiplano	Southern Altiplano
Qorito	Unidentified	Huari	Southern Altiplano	Southern Altiplano
K'ili Koa	Leaf	Viacha	Northern Altiplano	
Chaqiri	Shells	Huari	Altiplano	Altiplano
Copal	Resin	La Paz Huari	Apolo	Apolo
Tani tani	Flower	Oruro	Altiplano	High altiplano
Aloe vera (Caracollos mesa fresh)	Leaf	Local	Andes	Andes
Tika K'oa (Caracollos mesa)	Leaf	Viacha	Viacha	High altiplano

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