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# ALTERNATIVE PHARMACEUTICALS

## The technoscientific becomings of Tibetan medicines in-between India and Switzerland



Thesis submitted to the School of Anthropology and Conservation in compliance with the requirements of the degree of Doctor of Philosophy of University of Kent

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Cover image:

*Agar-35 pills (rilbu)* drying on the roof of Men-Tsee-Khang's pharmacy (21 May 2014, photograph taken by the author, courtesy Men-Tsee-Khang) / PADMA 28 capsules on the dosing plate of the new packaging line (15 June 2016, kindly provided by PADMA AG)

# Abstract

## ALTERNATIVE PHARMACEUTICALS

### The technoscientific becomings of Tibetan medicines in-between India and Switzerland

Jan M.A. van der Valk, School of Anthropology and Conservation, University of Kent

This doctoral dissertation forges and explores connections, flows and frictions between two seemingly unrelated manufacturers of Tibetan medicines: Men-Tsee-Khang, the Tibetan Medical and Astrological Institute in Dharamsala (Himachal Pradesh, India), and PADMA AG in Wetzikon (Zürich, Switzerland). Adopting a translocal, multispecies approach by positioning plant-medicines as the central actors in this ethnography, I trace how four plants – *aru*, *ruta*, *tserngön* and *bongnak* – become part of medicine in and between these two establishments of Sowa Rigpa of similar age and output volume, situated in highly diverse contexts at a stereotypical ‘periphery’ and ‘core’ of Western technoscience respectively. Inspired by Science and Technology Studies and by Pordié and Gaudillière’s (2014a) ‘reformulation regime’ of industrial Ayurvedic proprietary products, I analyse the on-going material, technoscientific, and regulatory reformulations of Tibetan *materia medica* as they are actualised in contemporary recipes based on classical texts.

In this thesis, I describe how both PADMA and Men-Tsee-Khang refer to Tibetan medical texts yet also rely on botanical taxonomy for plant identification. Both face the uncertainties of sourcing raw materials in bulk from growers and traders on the Indian market, skilfully mass-produce pills by means of machines for grinding, mixing, sieving and packaging, and depend on in-house laboratory analyses and each-other’s expertise in the construction of hybrid ‘qualities’. They are also forced to interact with technomedical conceptions of drug safety and toxicity, and with European medicine and food registration legislation to varying degrees. I argue that in performing this series of technoscientific reformulations, Tibetan medicines are becoming ‘alternative pharmaceuticals’: liminal,

paradoxical yet politically subversive things oscillating betwixt and between tradition and modernity, orthodoxy and innovation, East and West. Men-Tsee-Khang and PADMA could thus be interpreted as two possible instantiations of a *quasi*-industrial techno-Sowa Rigpa, but only if one distinguishes 'Big' from 'Small Alternative' Pharma, and never without leaving crucial contradictions and identity politics behind.

For my teacher, *amchi* Pasang Yönten Arya Tendi Sherpa, in whose footsteps I followed,  
traveling in-between Men-Tsee-Khang and PADMA

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Although Pasang Yönten was the one who formally introduced me to the intricacies of Tibetan medical theory and practice even before the start of my PhD in September 2012, I consider each and every one of the people I came in touch with during the entire research process to be my esteemed teachers and noble friends. It is impossible to acknowledge all of you here by name, but this does not mean I am any less grateful.

I was very fortunate to be allowed to conduct fieldwork at Men-Tsee-Khang in Dharamsala, volunteering as a botany and English language teacher, copy-editing a book on the cultivation of endangered medicinal plants, and working with Tibetan doctors and scientists at the Materia Medica Department (especially Tsultrim Kalsang, the coordinator of the collaboration, and Tsering Norbu), Pharmaceutical Department (Tenzin Thaye and D. Penpa), Quality Assurance Laboratory (Phurbu, Norla and Tadze), and Gangkyi clinic (Sonam Wangmo). My heartfelt thanks go to the Director, Tsering Tashi Phuri, and his personal assistants (Tseten Dorje and Kalsang Dechen) for facilitating this mutually beneficial exchange, and to all Men-Tsee-Khang students and staff participating in my classes and research. Tsultrim-la, your initial backing of my project and the wonderful mountain plant hunts we organised will never be forgotten.

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Last but certainly not least, words fail to express the unconditional and boundless love I received and continue to receive from my parents, parents-in-law, my spouse Wim Peumans, and my cat and ever-present writing buddy Stip.

Without all of your support, this thesis would have never materialised. I am forever grateful.

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# Note on Tibetan language terms

In the main text of this thesis, Tibetan terms are italicised (except in personal names) and rendered in a simplified phonemic transcription (following the Tibetan & Himalayan Library, <http://www.thlib.org/reference/transliteration/phconverter.php>). This aims to give non-specialist readers a more intuitive sense of their pronunciation, which is not straightforward to deduce from the standard scholarly transliteration system (Wylie 1959). The Glossary provides the latter, supplemented with a relevant, brief English translation of all the terms mentioned. Reflecting common usage however, I use 'Sowa Rigpa' (not *sowa rikpa*) to denote the Tibetan 'science/knowledge of healing'.

The link between Tibetan medicinal plant names and botanical taxonomy is problematic and should be treated with much caution, as I argue in Chapter 1. I provide Linnean names only to give a rough approximation of how a certain plant (or plant part) was identified by a specific author at a specific time and place. This however does not imply I necessarily agree, nor that I carried out or verified the botanical identification. Scientific names marked with an asterisk in the Glossary are my own tentative identifications, based on the observation of live plant material and on comparison with relevant field guides and floras.

# Acronyms

ANT	Actor-Network-Theory
AYUSH	Ministry (previously Department) of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, Government of India
CAM	Complementary and Alternative Medicine
CCTM	Central Council of Tibetan Medicine, Central Tibetan Administration
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
FDA	US Food and Drug Administration
GxP	Good Practice guidelines; includes Good Agricultural (and Collection) Practices (GACP), Good Manufacturing Practice (GMP), Good Distribution Practice (GDP), etc.
HPRD	Herbal Product Research Department, Men-Tsee-Khang
NMPB	National Medicinal Plants Board, Government of India
NTFP	Non-Timber Forest Product, also called Minor Forest Product (MFP) in South Asia
QAL	Quality Assurance Laboratory, Men-Tsee-Khang
STS	Science and Technology Studies, or Science, Technology and Society
SVKH	<i>Schweizerischer Verband der komplementärmedizinische Heilmittelhersteller</i> ('Swiss Association of Complementary Medicine Producers')
TCM	Traditional Chinese Medicine
THMP	Traditional Herbal Medicinal Product
TMAI	Tibetan Medical and Astro. Institute, more often called Men-Tsee-Khang

# Maps

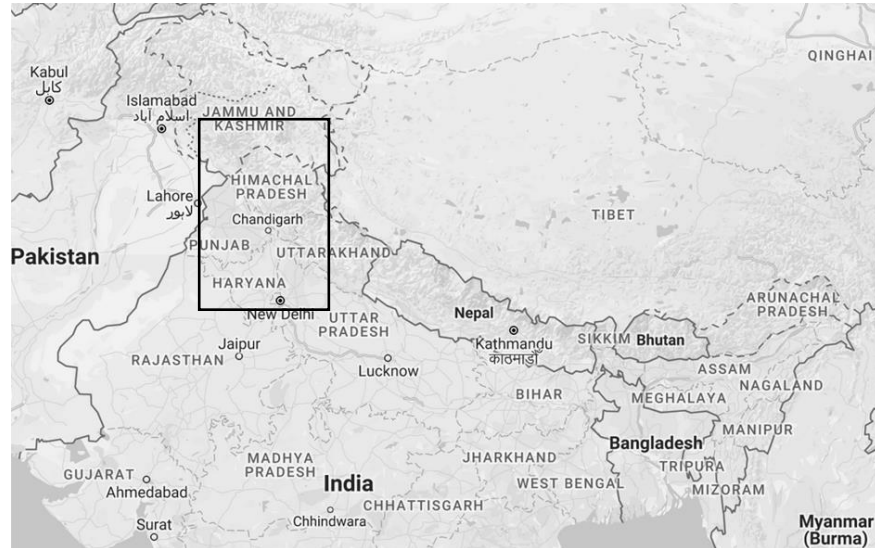


Figure i. Map of North-West India. My main fieldsite was at Men-Tsee-Khang (Gangchen Kyishong, Dharamsala), but for Chapter 2 in particular I also travelled to New Delhi, Amritsar, Manali and surroundings. The scale bar is 100 km. Adapted from Google Maps (2016).





Figure ii. In Switzerland I worked mainly at PADMA AG, in the outskirts of Zürich. The head office was situated in Hinwil until 2015, but then moved closer to the production and laboratory sites in the nearby town of Wetzikon. The scale bar is 1 km. Adapted from Google Maps (2016).

# INTRODUCTION

'Tibetan medicine in India *and* Switzerland!?' Why didn't you go to Tibet?' This is the most common question I got from friends and family in response to my pitiful attempts at explaining what my PhD was about. Many somehow continued to hold on to the idea I actually did fieldwork in Tibet, even after me telling them this was not the case. The reason for this is understandable and seems justified: did Sowa Rigpa, 'the science/knowledge of healing', not originate in Tibet? Yes, and no. The early history of Sowa Rigpa and its foundational compendium *The Four Tantras (Gyüzhü)*, compiled and edited by Yutok the Younger in the twelfth century CE) is still fragmented and underexplored (Blezer et al. 2007, but see Ga 2010). Its origins – Indian, 'Buddha's Word', 'indigenous' Tibetan or even Chinese – have long been a source of controversy (Czaja 2005-2006, Ga 2010), whereas many Tibetan histories reconstruct the founding of 'Tibetan medicine' as a synthesis based on a seventh-century conference of Greek, Chinese and Indian medical authorities at the court of King Songtsen Gampo (Garrett 2007, Yoeli-Tlalim 2012). These complex syncretic precedents notwithstanding, nowadays some scholars and practitioners adhere to a monolithic, traditionalist view which takes the establishment of classical orthodoxy in 17-18<sup>th</sup> century early modern Tibet under the Fifth Dalai Lama (1617-1682) and his regent Sangyé Gyatso (1653-1705) as a reference point (Blezer et al. 2007, see Gyatso 2015). The idea that Sowa Rigpa in its purest form is to be found on the Tibetan plateau has however been compromised since the Chinese Communist invasion of the 1950s, often construed as the demise of traditional Tibetan society. Since His Holiness the Fourteenth Dalai Lama fled to India in 1959 and eventually settled in the Himalayan hill station of Dharamsala, the waves of Tibetans who followed him into exile were seen as the only true carriers of Tibetan culture (Prost 2008). This exile movement created the largest refugee group in India, and led to the re-establishment of Lhasa's Mentsikhang (*mentsikhang*, 'house of medicine and astrology') in Dharamsala in 1961. This re-established exile institution is now known as Men-Tsee-Khang, or The Tibetan Medical and Astrological Institute (TMAI). The attendant politics and ethics of compassion and national-cultural survival, which eventually led to the

official recognition of Sowa Rigpa as an 'Indian System of Medicine' in 2011, have been analysed in detail by anthropologist Stephan Kloos (2008, 2010, 2012, 2013, 2015). Men-Tsee-Khang positioned itself as the 'guardian of tradition' even though the number of independent or 'private' Tibetan medicine practitioners (*amchi*) continued to increase over the years, and even though other (smaller) educational and manufacturing organisations and the exile-government Central Council for Tibetan Medicine were founded. In this re-invention of Tibetan medicine, engagements with modern biomedical science were granted a central role following the repeated instruction by the Dalai Lama himself (Kloos 2010, 2015). The dynamic, multi-directional and multi-faceted interactions between these sciences and medicines is also the central theme of this thesis. This in itself is not an argument as to why I didn't go to Tibet, where the recent rise of a large-scale Sowa Rigpa industry has already been described by Saxer (2013), but it does at least indicate why it made sense for me to go to Dharamsala.

But 'Why Switzerland?'. Besides this being the title of a book which highlights its unique historical, linguistic, economic, religious and social features (Steinberg 1996), it also happens to be one of the first countries that accepted Tibetan refugees (Lauer 2013, Schlieter et al. 2014). The first wave of mostly orphaned children arrived in 1960, the year after the Tibetan uprising in Lhasa which led to the flight of the Dalai Lama. Switzerland currently houses the largest population of exiled Tibetans in Europe: roughly four thousand, of which a sizeable proportion consists of second-generation Tibetans who obtained Swiss nationality by birth. But this is not only why. Coincidentally, a Buryat-Russian family lineage of Sowa Rigpa was also settling in Switzerland in the early 1960s (Badmajew et al. 1982, Saxer 2004). The Poland-born biomedical surgeon Peter Badmajew was looking to preserve the precious knowledge and recipes of previous generations after the death of his father, an eminent Tibetan doctor who had been baptised in St.-Petersburg with Czar Alexander II as his godfather (as his father was court physician to the Romanovs) and who had himself treated two Polish presidents. After ruling out other options Peter Badmajew got in touch with the Swiss pharmaceutical businessman Karl Lutz, who had cultivated a keen interest in Tibetan medicine. Together, they experimented with the famed Badmajew formulas until they were able to reproduce several of them in Zürich. In 1969, the pharmaceutical

company PADMA AG was born. PADMA does not present itself as a bastion of tradition as Men-Tsee-Khang does; it is rather a pioneer within the contentious European Complementary and Alternative Medicine (CAM) industry (Schwabl and Vennos 2015). In this thesis, I seek to investigate connections, flows and frictions between these two seemingly unrelated manufacturers of Tibetan medicines. I argue that they face some fundamentally similar challenges, relating especially to their interfaces with modern Western technoscience. But how can you meaningfully compare Men-Tsee-Khang with PADMA? The former is located in a small touristic town on the lower flanks of the Indian Himalayas, while the latter is based in the outskirts of Switzerland's largest city. PADMA is the only company that produces medicines and supplements within Europe based on Tibetan formulae and according to European and Swiss pharmaceutical standards, whereas Men-Tsee-Khang is considered by many to be the prime institution in exile involved in the education and production of Tibetan medicine. Serendipitous and superficial comparisons such as Dharamsala's now out-of-fashion and almost cynical nickname 'Little Switzerland', referring to a past of more quiet and clean pine-forested mountain flanks, mask their vastly different ecologies and histories. Consider for instance the extreme wealth inequality between these countries: a one-litre bottle of mineral water has a fixed maximum retail price of twenty Indian rupees (0.30 USD) in India, while you can easily pay CHF 4.50 (4.6 USD) in a Swiss restaurant; a fifteenfold difference. The arguments in this thesis, however, do not foreground this type of one-on-one correspondences, nor do they rely on macro-economic or macro-political comparisons in general. I actually conducted two separate ethnographies with the same interests, discovered linkages, and endeavoured to integrate these into one overarching set of arguments. My approach is not just multi-sited, it is translocal, looking at the performance of technoscientific practices *in* – and *inter* – *situ* by tracing how four Tibetan medicinal plants are (re)formulated and transformed as they become (part of) medicine at PADMA and Men-Tsee-Khang. Both refer to classical Tibetan medical texts for their recipes, source plants from Indian growers and traders, use not too dissimilar machinery in their (mass-)production, rely on in-house laboratories for quality control of raw materials and medicines, and are forced to interact with biomedical notions of safety/toxicity and food and medicine registration regimes to varying degrees.



Figure iii. A pictorial comparison of Men-Tsee-Khang (left) and PADMA AG (right). The first row shows the colourful accommodations in Dharamsala's touristic Tibetan town of McLeod Ganj, and some stately buildings along Zürich's Limmat river. The second row depicts the entrances to the head offices of both institutions (PADMA moved their office to a new address in Wetzikon as of 2015), and the last row to the areas where pharmaceutical production takes place.

## The question: How do Tibetan *materia medica* become technoscientific?

In this thesis, I propose to approach the Tibetan *materia medica* (*men*) under study – processed and manufactured by Men-Tsee-Khang and PADMA – as ‘alternative pharmaceuticals’<sup>1</sup>, expressing the liminality of these institutions and their products. The political paradoxes and inherent tensions generated between these two wor(l)ds in the title of my thesis is what will be explored throughout the following chapters and returned to in the Conclusion. To sustain this argument, I describe how *men* ‘become technoscientific’ in and between these two places through innovative entanglements. I analyse their simultaneous material and symbolic transformations and reformulations as these manufacturers commensurate the situated knowledges of Sowa Rigpa and botanical taxonomy in their attempts to identify and name plants (Chapter 1), brave the paradoxes of the labyrinthine yet technocratically regulated Indian herbal markets (Chapter 2), skilfully mass-produce medicine in a human-machine-plant-environment meshwork as pharmaceutical artisans (Chapter 3), create and enact hybrid ontologies of quality in labs (Chapter 4), challenge and modulate the poison/medicine dichotomy (Chapter 5), and coproduce an identity as ‘Small Allternative Pharma’ together with a multiplicity of medicine (re)formulations in response to dynamic European and national regulatory and political realities (Chapter 6).

Methodologically, I adopt a multispecies and multi-sited – or more precisely translocal – ethnographic approach of ‘following the thing’ (see Methodology), tracing how four commonly used Tibetan medicinal plants – *aru*, *ruta*, *tserngön* and *bongnak* – are reformulated as they are actualised in contemporary recipes based on classical texts in both India and Switzerland. This does not only allow for comparative insights – even though this is problematic given the highly diverse contexts – but more importantly aids in elucidating transmissions of knowledge, experience and technologies between these two establishments of Tibetan medicine of similar age and productive output volumes, situated in a ‘core’ and a ‘periphery’ of modern Western technoscience respectively but facing some

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<sup>1</sup> It should not come as a surprise to the reader that this idea has already been commercialised. See for instance the Egypt-based dietary supplement business called Natural Alternative Pharmaceuticals, Inc. ([www.naturalalternativepharma.com](http://www.naturalalternativepharma.com)).

surprisingly similar issues when it comes to matters of manufacture. Within these heterogeneous biosociotechnical networks in which the worlds of plants and pills collide, I thus emphasise (1) the dynamic identities and agencies of ‘nonhumans’ and materials, especially as witnessed in/through (2) technoscientific practices and in (3) varying regulatory realities. Inspired by Science and Technology Studies (STS), I position Tibetan plant-medicines as the central actors in this ethnography, showcasing their material, technoscientific and regulatory transformations and how these potent substances in turn transform their environments and other actors involved.

A nuanced perspective is necessary to redress the polarisation of both ‘scientific’ (anti-)alternative medicine discourses and their traditionalist, essentialist counterparts. I aim to go beyond superficial searches for scientific evidence and allegations that the public is being misled by inauthentic, non-efficacious Complementary and Alternative Medicine (e.g. Ernst 2008, Ernst and Singh 2008), recognising the productive effects and limitations of definitions for this socially, historically and legally varied spectrum of healing resources (Gale and McHale 2015).<sup>2</sup> Over the past fifteen years there has been an explosion of sociological scholarship on ‘traditional medicine’ and CAM (reviewed in Gale 2014). This work typically entails quantitative and qualitative studies of user and practitioner experiences, beliefs and practices, with newer research avenues exploring societal patterns of change and epistemological questions. The pragmatism of medical pluralism has been documented along with how ‘integrative’ medicine strategies frequently retain colonial and modern power asymmetries, while not overlooking the creation of hybrid forms of

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<sup>2</sup> I concur with Gale and McHale (2015) who prefer the following operational definition for CAM by the Cochrane Collaboration (Zollman and Vickers 1999, p. 693), as it indicates the sociocultural basis for the conventional/alternative distinction and its dynamic, fluid nature: ‘[c]omplementary and alternative medicine (CAM) is a broad domain of healing resources that encompasses all health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period’. The WHO (2013) recognises that CAM overlaps with traditional medicine, which is often considered ‘indigenous’ and as having a long history. But for WHO ‘traditional’ already implies ‘modernised’ (Kadetz 2012, Schwabl 2009). Moreover, Swiss researchers have argued for a formal distinction between American CAM – which generally advocates an integrative medicine paradigm and includes modalities such as prayer – and Complementary European Medicine or CEM (Uehleke and Saller 2011). Besides ‘Traditional European Medicine’ the latter would also include adapted Asian medical systems, amongst others. Nevertheless, biomedicine problematically remains the absent presence and often also the arbiter in these conceptualisations, so applying these categories may constitute an act of symbolic violence (Gale 2014).

practice. Importantly, subjecting CAM modalities to scientific scrutiny has been found to be one of the primary means through which biomedicine stays in control, in addition to selectively co-opting successful 'alternative' aspects.

Anthropology on the other hand has surprisingly paid much less attention to these 'non-biomedical' approaches to health compared to sociology and clinical researchers, particularly in industrialised countries (but see Nissen and Manderson 2013, for instance). In the introduction to her concise textbook on this subject, however, Ross (2012) sets out an explicitly anthropological approach to 'alternative medicine': the challenging, highly dynamic (across space and time), eclectic and elusive Other of modern biomedicine. She consciously opts for the term 'alternative' in the face of the widespread (but partial) complementarity and integration within dominant healthcare systems since its Latin root *alter* captures its oppositional, elusive and often subversive nature whereas the verb 'to alternate' evokes the dynamism of cultured therapeutic processes and therapeutic pluralism.

Even though it may not be taken kindly by some proud proponents of Asian *scholarly* medicines (as opposed to the popular/folk nature of many CAM practices) that have long dominated the medical arena in their respective homelands and continue to be the main recourse to health in many places, I concur with Ross that granting these living traditions – or at least many of their contemporary healing substances – an alternative status should not be considered derogatory but seen as an endorsement for their continued uniqueness, resilience and potency. Asian industrial proprietary medicines have already been interpreted as instantiations of 'alternative modernities' (Hsu 2009, albeit tentatively; Pordié 2012 and Kloos 2015, amongst others). In a similar vein, I extend Pordié and Gaudillière's (2014a) 'reformulation regime' to Tibetan *materia medica*, as these should equally be considered highly innovative, re-invented pharmaceutical reformulations. In this sense, the products of PADMA as well as Men-Tsee-Khang can be said to constitute 'alternative pharmaceuticals'.



## A Eurocentric historical prelude: the rise of technomedicine – becoming pharmaceutical, becoming alternative

The boundaries between ‘conventional’, ‘regular’ or ‘orthodox’ medicine and its binary opposite have been fluid and permeable, as Roberta Bivins (2015) shows in her historical sketch of professional debates and the positions taken by medical consumers therein in the US and Britain. The rise of ‘alternative medicine’ is intricately tied up with the history of ‘biomedicine’: the re-discovery, -translation and -invention of Greek and Roman classical medical texts in the academies of the late middle ages and renaissance as a humanistic, secular medicine; the onset of the Scientific Revolution in the sixteenth century with its valuation of experiment and mechanistic mathematics; and the seventeenth-century colonial enterprise and contacts with Asian medical systems. As medicine was increasingly defined as a science that engendered public confidence, the cultural capital of academic medicine rose and calls for state regulation were strengthened. A discourse of paternalistic consumer protection which brandished patients as ‘desperate’, ‘ignorant’, ‘hysterical’ and ‘irrational’ was mobilised, while the emerging ‘alternative’ practitioners were generally more welcoming to women (as opposed to the white male medical establishment) and continued to hail the naturalness, harmlessness, and individuality of their therapies. Stringent medical market regulations heralded the twentieth century as the golden age of ‘scientific medicine’ until the 1970s, when ethical scandals, iatrogenic disasters and the increasing visibility of chronic diseases cemented in an anti-authoritarian counterculture which largely rejected the anti-quackery rhetoric. In a move away from regulatory paternalism towards neoliberal deregulation reforms and health consumerism, ‘Complementary and Alternative Medicine’ gained a new footing which once again provoked highly polemical and polarised debates that fail to reflect the historical, empirical, socioeconomic and cultural drivers for the ever-pervasive medical pluralism amongst patients/consumers.

The cross-cultural transmission of medical expertise and knowledge is clearly not a uniquely contemporary phenomenon, nor was it ever a unidirectional process. This implies that the debates at the frontlines between orthodox and heterodox practitioners, patients and

policy-makers often rehearse longstanding historical debates as they continuously shift the balance of power (Bivins 2007). Although twentieth-century orthodox medicine, now known as 'biomedicine', presents itself as an objective, scientific, universally valid monolithic system, the triumphant authority of science is fairly new and never unquestioned. As the holistic balance of classical humoralism – which itself questions the relevance of Western versus non-Western distinctions – faded after its reign of more than two millennia, notions of experiment and 'science' gained precedence over experience and scholarship. Biomedicine came into existence through the industrialisation of medicine, through rapid advancements in technology leading to far-reaching specialisation and institutionalisation supported by the modern nation-state.

More recently still, the technoscientific transformations of biomedicine have been conceptualised as 'biomedicalisation' by US sociologists (Clarke et al. 2003). In their view, American biomedicine underwent a second transformation from around 1985, which they argue is relevant to the European context as well. This transformation led to a shift from control over biomedical phenomena to fundamentally changing them through political-economic reconfigurations of the health sector, an explicit focus on risk and surveillance, bio-technological and bio-engineering innovations, transformations in biomedical knowledge circulation and information management, and the creation of customisable technoscientific identities. As part of this ambiguous wave of transformations, corresponding to a shift towards the ills of late and postmodernity, the selective co-optation and rebranding of aspects from competing knowledge systems and critical social movements was indicated as one of its key processes.

The recent advent of technoscientific biomedicine and the dynamic co-constitution of its Others is equally reflected in therapeutic products. A Eurocentric history of pharmacy traces the origins of the pharmaceutical to the isolation of alkaloids (as the purported 'active principles') from plants, starting with the opium poppy (*Papaver somniferum* L., morphine, 1804) and cinchona bark (*Cinchona* spp., quinine, 1820) in the early nineteenth century (Anderson 2005). Deeply embedded in colonial enterprise, these potent

substances were then supplemented by chemically synthesised drugs such as acetylsalicylic acid (originally extracted from willow bark, *Salix* spp.; chemically synthesised at Bayer in 1897) and psychoactive molecules such as barbiturates (developed as the hypnotic Veronal® in Germany, 1903). The latter category of 'fully synthetic' medicinal chemicals reflects the gradual integration of largescale laboratory-based pharmacy production with the organic chemical industry of coal tar-derived dyestuffs into a more or less unified pharmaceutical industry from the 1890s. The second half of the nineteenth century also brought new technologies for the mass production of sugar-coated pills, gelatine capsules and tablets. In the post World War II era, Big Pharma experienced exponential growth in the antibiotic era, but this ended in the early 1970s following increasing regulation in the wake of the 1961 thalidomide tragedy and spiralling healthcare, research and development costs. Since the 1980s the boundaries with the chemical-pharmaceutical, food and the new biotech industries have become ever more fluid through an intense process of mergers and acquisitions and inter-company financial and innovation networks, but therapeutic innovation has slackened nonetheless (see for instance Laird 2013).

Historians have noted how earlier forms of state regulation were rendered ineffective in the course of industrialisation and the mechanical mass-production and marketing of pharmaceuticals (Gaudillière and Hess 2013), as was horribly evidenced by public health scandals such as 'the thalidomide disaster' in Western Germany during the 1960s, resulting in the birth of more than four thousand severely deformed babies. In this complexified medical market, different 'ways of regulating' (professional, administrative, industrial, public, and juridical) should be seen as sociohistorical products whose articulation and arrangements are utterly dynamic. Regulations are tied up with the troubled professionalisation and crafting of pharmacy as an autonomous world of knowledge (first separating from botany, and later from chemistry), practice (medicine preparation and control), institutions (colleges, apothecaries) and administrative instruments (the pharmacopoeia) in nineteenth century Europe. Gaudillière (2013) for instance outlines how during World War II both Vichy France and Nazi Germany installed similar administrative procedures for the market authorisation of new medicines in recognition of the 'great transformation', which led industrially-made therapeutic agents to dominate the market.

The professional regulation of medicines by schooled pharmacists evolved into a virtual monopoly enshrined in state-sanctioned national pharmacopoeias and good practice recommendations by pharmacy and/or medical practitioner collectives. However, as the majority of medicines became mass-produced industrial goods during the interbellum, knowledge and control over these specialties slipped between their fingers, leading to the contested and gradual emergence of industrial regulation. Quality control and standardisation were emphasised as means to maximise revenues through resource-efficient production, foregrounding technological issues, process management and marketing as regulatory tools.

Nonetheless, plant extracts remained at the core of the European pharmacopoeia until well into the twentieth century. The industrialisation of these *materia medica* was equally controversial and reliant on the shifting intersections between different ways of regulating. Gaudillière (2013) documents these strands of ‘alternative pharmacy’ in the companies Dausse (interwar France) and Madaus (Germany), both of which combined pharmaceutical innovation and mechanisation with a holistic vision that took into account synergies and the integrity of plants as complex healing agents. He notes that:

[a]s boundary objects between alternative medicine, classic *materia medica*, biochemistry, and the industrial production of extracts, biological therapeutic agents had a critical importance with translation processes working in several directions, that is, rationalizing popular or classic practices, but also contributing to the molecularization of plant extracts. (Gaudillière 2013, p. 85)

Aligning themselves with the increasingly influential popular natural medicine movement of the 1920s-1930s onwards while harnessing laboratory chemistry, the above-mentioned companies are examples of local cultures of innovation within the industrial way of regulating not too dissimilar from what I describe in the chapters that follow.<sup>3</sup> Not only is

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<sup>3</sup> Gaudillière (2014) cautiously compares this process to analogous elements in the contemporary pharmaceuticalisation in India, leading to ‘techno-Ayurveda’. However, he remains attentive to several important distinctions: the use of crude parts or extracts of entire plants and of complex multi-compound medicines, a much deeper divide between oral and scholarly knowledge traditions, and the current context of economic and health globalisation. According to Gaudillière, these peculiarities confer an alternatively modern status to this transformation, which is much more about the appropriation of industrial technology and the construction of markets than about professionalisation and institutionalisation.

the conventional/alternative medicine distinction historically contingent and politically contested, but so too is the category 'pharmaceutical', as it grew to include not only plant extracts but also petrochemicals, hormones, antibiotic molecules, vitamins and a whole series of other pharmacological groups while (nearly) excluding the complex multi-compound mixtures which are considered healing substances in Asian scholarly traditions.

### State of the art: the transformations of Asian scholarly medicines

Under the following two subheadings I briefly outline how academic conceptions of change in Asian medical traditions in our recent times of increasing interconnectivity have themselves evolved, positioning my contribution within the literature. The first section covers macro-level 'systemic' considerations and supports my use of the term 'alternative'. The second section concentrates on the transformations of therapeutic products, reviewing pertinent perspectives on 'pharmaceuticals'.

#### Becoming alternative? From modernisation and westernisation to globalisation and beyond

The comparative study of Asian medical traditions – across regional as well as classical/philological versus contemporary ethnographic boundaries – emerged out of the foundational work by medical anthropologist Charles Leslie (1974, 1976; Leslie and Young 1992; see Nichter and Lock 2002). Leslie emphasised the integrity and dynamic nature of these systems of medicine, while arguing for the recognition of medical pluralism and against modernisation discourses based on the hegemony of 'cosmopolitan medicine'. Recognising the cross-cutting effects of modernity, Leslie early on cautioned against the reification of modern/traditional dichotomies as it builds on the false premise of static traditionalism and evokes a stereotyping rhetoric of medical ignorance and superstition. Similarly, the professionalisation and spread of 'Western medicine' is inherently transcultural, a misleading categorisation feeding on troublesome ethnic, colonial and nationalist sentiments. The unquestioned ontological privilege granted to 'science' and its logical empiricism in medicine, and the acceptance of the validity of modernisation and

westernisation by many intellectuals of the second half of the last century has itself co-produced the very idea of a medical 'system' in its systemisation of reality (Leslie 1980). Leslie and contributors to his seminal edited volumes have shown how the politics of (anticolonial) nationalism equally infuses and legitimises 'indigenous' medical revivalism and syncretism as well as self-conscious attempts at preserving authenticity.

This attention to national identities and 'politics of culture' was then taken forward within the context of 'globalisation' and transnationalism, to the production and dissemination of medical theories and practices beyond nation-states, and to the flexibility and anxieties created by increasing exchange (Alter 2005). Indeed, these politics have themselves contributed to the virtual impossibility of escaping the hegemonic categories of science and medicine. Countervailing this tendency, Alter proposes reconceptualising Asian 'medicine' as a mimetic instantiation of immortality, 'a devolved form of alchemy':

perhaps it is better to conceptualize what has come to be called Asian medicine as being various experimental techniques concerned with embodied life and longevity. Consider alchemy, and the embodiment of alchemy, that is found in yoga and *qigong*. With reference to this, medicine as a conceptual category can be thought of as a pragmatic, body-oriented copy of techniques designed to transform nature itself.

(Alter 2005, p. 18)

This, he contends, helps to reconsider 'Asian medicines' as alternative *to* modernity, instead of 'alternative medicine' (reliant on scientific legitimacy) or 'alternative modernity' (following Knauff 2002). This notwithstanding, Langford (2002) documented an ayurvedic modernity that took its marginalisation as an opportunity for (neo)colonial reinvention over the twentieth century. Professional Ayurveda emerged as a parallel science and medicine, which at once also implicitly critiques and redefines science itself in a form of mimicry 'not as a failed imitation but as an embodiment of power in which the terms of power can possibly be rewritten' (Langford 2002, p. 9). Dismantling her own reliance on a modern episteme, she came to understand Ayurveda as itself a force of historical change while acknowledging that a complete escape from tautological modern/traditional

dichotomies seems impossible.<sup>4</sup> Considering Chinese *materia medica* and the antimalarial artemisinin (derived from *qing hao*, *Artemisia annua* L.) in particular, Hsu (2009) similarly argues that their varied transformations into proprietary medicine deserve to be considered instantiations of an alternative modernity instead of mere 'Westernisation', even though their alterity is limited by strong commercial and biomedical influences which confuse and creatively combine categories such as Chinese/Western, natural/synthetic, and traditional/modern.

In an edited volume on the globalisation and identity politics of Sowa Rigpa under various ethnic, national and regional guises (Pordié 2008a) – as 'Amchi medicine' in North-West India, Nepali 'Himalayan medicine', 'Bhutanese' or 'Mongolian traditional medicine' or 'Buddhist medicine' – Pordié aims to capture its contemporary dynamics with the notion 'neotraditionalism':

a diversification of healers' activities and a multiplication of legitimating instances, their proximity to biomedicine on the practical, epistemological and symbolic planes, or the fact that they would be both subject to and participants in globalization (deterritorialization of actors and practices, modern transnationalization of knowledge) and that they would make systematic use of 'tradition' to legitimate new practices.

(Pordié 2008a, p. 9)

Neotraditionalism is characterised by the appropriation of modern ideologies, epistemologies, rhetoric and practices together with a selective accentuation or re-presentation of classical (textual) ideals. This refashioned medical practitioner identity has in turn facilitated an integration into Euro-American populist, orientalist New Age discourses. Zimmermann (1992, p. 216) wrote that ayurvedic advertisements and medicine catalogues refashion treatment as 'the violence of catharsis is transformed with the nonviolence of oil bath' in accordance with Flower Power ideology, creating a modern Ayurveda that includes syncretic additions such as 'Ayurvedic massage' (cf. Wujastyk and Smith's 2008 lineages of ayurvedic globalisation). Janes (2002) also points out that Western desires for an 'authentic' alternative to biomedicine, holistic healing and Eastern spirituality

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<sup>4</sup> Refer to Adams (2001) for another attempt at particularising modernity in the case of Tibetan medicine, and to Saxer (2011) for its interface with early Russian modernities.

leads to a very different Tibetan medical practice in the US. Educational non-profit organisations provide adapted Tibetan medical and massage courses, greatly raising Tibetan medicine's profile by training Westerners while also heavily emphasising its Buddhist aspects in accordance with New Age ideologies of spiritual healing (Vargas 2008). Millard (2008, 2010; Soktsang and Millard 2013) has also documented how a Tibetan *amchi* necessarily adapted his practice (for instance omitting venesection and cauterisation), products (e.g. the substitution of animal and mineral ingredients) and language (patient communication through biomedical categories) to cater for patients in Europe. In these contexts, the clash with conflicting ideologies and the mingling of multiple theories and practices might be even more pronounced than in Asia: what is officially recognised as a medicine – and as 'tradition' – may be more strictly guarded (Schwabl 2009). Tibetan medicine practitioners thus have to operate within the alternative sector and interact with its patients/customers (see also Tokar in Pordié 2008, Kloos 2012).

In line with the abovementioned shift from modernisation to a complex, multidirectional globalisation of Asian scholarly medicines I aim to strengthen the move away from these totalising narratives (following Kim 2009, Scheid 2013 and Zhan 2009, amongst others). Zhan (2009, p. 1) for instance, in her multi-sited ethnography of Chinese medical knowledge production, highlights that 'what we have come to call "traditional Chinese medicine" is made *through* – rather than prior to – various translocal encounters and from discrepant locations', each of those three words themselves being sources of contingency and complexity leading to provisional outcomes in specific encounters. She writes against what she calls reductive globalism, instead offering an alternative account of translocal displacements and refigurations she terms 'worlding'. In a recent volume edited by Scheid (2013, p. 6) on emotion-related disorders in East Asian medicines, the emphasis on regional historical flows equally creates opportunities for 'escaping from the narratives of accommodation/resistance [to westernisation along biomedical lines] that define the response/impact model of modernization'.



An analogous proposition has been made stemming from anthropological enquiries into Sowa Rigpa. Adams et al. (2011a) argue that the cross-cultural translation of scientific epistemologies is contingent on spatiotemporally embedded histories and politics of knowledge that trouble *a priori* relations between science, medicine and religion. In Tibetan contexts in particular the relation between Western science and biomedicine and Sowa Rigpa is one of multidirectional engagement, creating hybridised knowing practices and instances of Tibetanised or Tibetan-Western science. Complicating notions of science, these scholars suggest 'a Sowa Rigpa sensibility' as a subtler epistemological starting point, a foundation that is upheld in the face of adaptability, permeability and flexibility of local practices on the ground. Innovation in Tibetan medicine continues to rest on textual research for instance, and to imply different models of efficacy. Neither biomedicine nor Sowa Rigpa are uniform or complete categories or even discrete medical systems. Both are inherently integrative and have been in conversation more intensively since the turn of the last century. A first wave of early modern encounters took place on the outskirts of British colonial power in Tibet, and of the Russian empire in Transbaikalia; the second wave was orchestrated by Chinese communism in the 1950s (Chinese biomedicalisation through the training of barefoot doctors, the expulsion of religious and superstitious elements, the setting-up of hospitals) and the reframing of medicine and public health in postcolonial India in exile; the third wave commenced at the onset of the new millennium, and is marked by the growth of a pharmaceutical industry as well as new colleges in various countries as part of a broader drive towards global, market-driven pharmaceutical research. As Samuel concludes in an epilogue to Adams et al.'s (2011a) work, there should be nothing to fear in genuine and mutually enriching exchange in this pragmatic context even though it will inevitably transform both sides.<sup>5</sup>

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<sup>5</sup> Scheid and MacPherson's (2012) edited volume contains several critical contributions to the healthcare integration dilemma, emphasising culturally sensitive interdisciplinarity. Conversely, Adams and Li (2008) found an overall trend toward the substitution of Sowa Rigpa for biomedical options in integrated diagnosis and treatment at Lhasa's Mentsikhang that is far removed from balanced integration, instead undermining its integrity and erasing difference.

## Becoming pharmaceutical? From the social lives of medicines to pharmaceuticalisation and reformulation

By virtue of its name, the anthropological study of ‘the social lives of medicines’ (cf. Whyte et al. 2002; see also Das and Jeffery 2009, Lévy and Garnier 2007, Petryna 2006, van der Geest and Whyte 1988, and van der Geest et al. 1996) has focussed solely on biomedicines as a reaction to and critique of the subfield of ethnomedicine, which until at least the early 1980s only seemed to be interested in explaining ‘exotic’ or ‘indigenous’ healing practices. More than two decades ago, Mark Nichter (1992, p. ix) noted that medical anthropology often had a biomedically-inspired, applied public health agenda while ethnomedical enquiry was habitually compartmentalised as ‘the study of folk illnesses, traditional medical systems, herbal remedies, and healing rituals’. Critiquing this division and the related reification of disease as a universal construct versus illness as a culturally mediated, individual experience, Nichter reveals how nostalgic and paternalist scientific researchers’ sentiments construct accounts based on problematic assumptions of alterity. Along these lines, Nichter and Vuckovic (1994) advocated for ‘an anthropology of pharmaceutical practice’ with a broadened scope: moving from rational drug use discourse to investigations of the rationales underlying the manufacture, prescription and demand of medications by approaching medicines as vehicles of ideology, constructors of illness identity and markers of social identity. As the anthropology of biomedical – or more precisely biomolecular – pharmaceuticals developed, the practices and products of the biomedical establishment and the pharmaceutical industry were thoroughly denaturalised.

Regrettably however, non-biomedical *materia medica* were largely forgotten along the way, insinuating that they are not proper medicines or at least not pharmaceuticals.<sup>6</sup> Indeed, ‘medical anthropology has seemed hitherto to lack in full engagement with phytomedical

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<sup>6</sup> As the social lives approach gained prominence, issues of political economy and marketing were foregrounded in the study of Asian medicines as well, interpreting medicines as commodities and focusing on the elaboration of processes such as the commodification and pharmaceuticalisation of health and medicines (see Bode 2008, p. 1-17 for a review and also Banerjee 2009 and others in the same book series for early applications). In the case of Sowa Rigpa, this approach has been extended to how the Tibetan ‘birth-helping pill’ became involved in the development of a randomised controlled trial in Lhasa (Craig 2012), and to the medical, religious and political perceptions of *tsotel* (purified mercury-sulphide ash) manufacturing and use (Gerke 2013).

reality, and the acceptance that the health care practices of most people on this planet depend on plants and animals' (Ellen 2006a, p. 10), reflecting a problematic gap between medical anthropology and ethnobotany (Waldstein and Adams 2006). But Hsu (2010) goes on to contrast the empiricist ethnoscientific approach with the phenomenological tenet that the self is inseparable from perception, and the centrality of the body in medical anthropology. Nevertheless, in drawing selectively from Merleau-Ponty's phenomenology, many medical anthropologists have wrongly separated the self from the environment much like in biomedicine, whereas its continuity with at least the technical environment has long been highlighted in STS. Inspired by Latour (2000), Hsu (2010, p. 25) asks: 'if we treat plants as "things in medical practice", would that mean that any medical anthropological-cum-ethnobotanical research project advances into the limelight of a Latourian STS project?' Even though *materia medica* are always (bio)cultural artefacts (Hsu 2009, Pordié 2002), medical anthropologists have had disappointingly little to add to material culture (but see Farquhar and Lock 2007). Curiously, anthropologists of pharmaceuticals have equally ignored materiality and 'have left the discussion of the drugs themselves and their physiological effects to biomedicine, accounted for socio-cultural aspects, and thereby inadvertently reinforced the Cartesian dualism that has set the agenda for the medical anthropological project' (Hsu 2010, p. 23). I aim to bridge this problematic divide between the symbolic emphasis of medical anthropology and ethnomedicine, and more materialist approaches in ethnobiology, by conducting an ethnography that revolves around medicinal plants and how they are transformed into Tibetan pharmaceuticals. By maintaining that these plant-medicines have inextricably social as well as material lives before and as (part of) pills, I aim to make medical anthropology more sensitive to non-humans.

Along similar lines, Pordié and Gaudillière coined the term 'reformulation regime' for the Indian Ayurvedic industry

to qualify contemporary manufacturing and production practices in this industry, as well as their central role in reshaping the way traditional knowledge-based pharmaceutical innovations are appropriated and protected by law. The reformulation regime therefore deeply questions the economic, epistemological, and regulatory context of pharmaceutical

innovation. It is affected by fundamental tensions related not only to the epistemic status of the products and their problematic relationship with the ayurvedic texts and practices, but also to their exploitation conditions (p. 59). [...] [It] consists neither in integrating plant preparations into biomedicine nor in adapting traditional practices into an industrial context; it consists in reinventing a 'traditional' drug by borrowing, for its development, from sometimes very distant medical paradigms. The reformulation regime is a work involving a recomposition based on unique knowledge-prospecting mechanisms and singular industrialization schemes for the remedies. Thus understood, drug 'reformulation' redefines knowledge and preparation practices, focusing on the properties of complex medicinal materials produced and sold on a mass scale for uses in which medical cultures are mixed. An essential aspect of reformulation is that it feeds the emergence of an autonomous 'pharmacy' (in the sense of a world exclusively devoted to therapeutic substances) that breaks with ayurvedic clinical practice both from a sociological point of view (preparations are no longer made by doctors but by persons specializing in medicinal plants and their manipulation) and from an epistemic point of view (formulations are ready-to-use mixes for specific indications, no longer ad hoc mixes that are part of an individualized treatment regime). Largely overlooking individual humoral variabilities, the mass production of drugs thus tends to simplify and depersonalize the act of healing.

(Pordié and Gaudillière 2014a, p. 59, 61)

For the purposes of my argument, it is instructive here to highlight some of the salient features of this notion further. This pharmaceutical innovation regime, which spurs re-invented traditional(-based) pharmaceuticals with recombined and standardised formulas within the redefined therapeutic networks of industrial mass production is not to be confused with small-scale, local interpretations, variations and modifications of classical recipes by doctors even though it draws legitimacy from these widespread practices. Nevertheless, it should be recognised that this regime is highly complex and heterogeneous. Although mechanisation is paramount and goes hand in hand with pharmaceutical production practices and biomedical *mélange*, the detailed procedures and outcomes of reformulation are extremely diverse: varying from company to company, from product to product, and across national and international spatiotemporal scales. At the end of their article Pordié and Gaudillière (2014a) conclude that this regime does not constitute a form

of pharmaceuticalisation<sup>7</sup> in which the Indian ‘essence’ is all but lost (*vide* Banerjee 2009); it is an emerging reconfiguration of Ayurveda. Pordié subsequently applied this framework to The Himalaya Drug Company and its products, building on STS notions of objects (2014) and paying special attention to their multiple material trajectories (2015). The first article (Pordié 2014) argues that Ayurvedic proprietary medicines are ephemeral, ‘empty’ pharmaceutical objects. Often in response to regulatory necessities, innovative (im)material attributes may be inserted, thus challenging the very idea of scientific objectivity. Kudlu (2016) on the other hand argues that Kerala’s regional market of ayurvedic ‘classical medicines’ produced by physician-manufacturers differs from the pharmaceuticalisation witnessed in mainstream industrial Ayurveda. The Keralan, clinic-centred distribution format ‘keeps the doctor in the loop’ and thus coproduces alternative value regimes as well as an alternative route to modernisation which countervails the dominant biomedical regime. In this thesis, I will expand and adapt the reformulation regime to the multiple transformations and reinventions evident in the different stages of manufacturing quasi-industrial Sowa Rigpa medicines both in India and in Switzerland.

### Conceptual meshwork: a postcolonial, post-ontological, Ingoldian STS of becoming

To make an original contribution to the thematic bodies of literature introduced above, I am inspired by several theoretical strands at the intersections of anthropology and (postcolonial) science and technology studies, integrating ethnobotanical aspects. The focus of my dissertation necessitated this multi-faceted approach. Since I contend that Tibetan medicines are becoming alternative pharmaceuticals, I first have to lay out what kind of ‘becoming’ I mean, and related to this what kind of ‘things’ I envision. For this, I

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<sup>7</sup> This term was first used in anthropology by Mark Nichter in 1989 (p. 268-335 in Nichter and Nichter 1996) as a descriptor for the commodification of health through the promotion of pharmaceuticals in India by public health policies and pharmaceutical multinationals espousing a capitalist modernisation ideology. ‘Pharmaceuticalisation’ was introduced to the sociology of pharmaceuticals by John Abraham in 2007 (according to Gabe et al. 2015, but see Bell and Figert 2012), and later defined by Abraham (2009, quoted in 2010 on p. 604) as ‘the process by which social, behavioural or bodily conditions are treated or deemed to be in need of treatment, with medical drugs by doctors or patients’. Williams et al. (2011) on the other hand have defined it as a heterogeneous socio-technical process as part of a ‘pharmaceutical regime’ similarly to Gaudillière and Pordié (2014a).

build on Ingold's thinking on meshworks, posthuman agency and materiality. Bringing his work into conversation with postcolonially and ontologically inflected strands of STS further allows for more nuanced attention to performative technoscientific practices, and situated constructions of more or less integrated sciences in ontologically fluid spaces.

### Becoming alive: Ingoldian agency, materiality and dwelling

Tim Ingold (2011, p. 89-94) unfolds several criticisms of Latourian Actor-Network Theory (ANT), contrasting it with his own musings on agency. He distinguishes between a network as 'a set of interconnected points' and a meshwork as 'an interweaving of lines'; material flows of life, growth and movement. According to Ingold, events are not caused by a network of distributed agency as in ANT, but *along* entangled (life) lines that are part of perceptive and thus enskilled organisms who are themselves entangled with an ontologically fluid space (the 'environment'). Two butterflies fluttering around each-other is then not conceived as a 'dance of agency' (cf. Pickering 1995) but becomes an interaction of alive butterflies-in-air. Granting some magical agency to air is ludicrous, in Ingold's opinion, and would still leave the butterfly behind as a dead object. From this perspective, Latourian nonhumans are inanimate – even though they (inter)act through a network of effects – and as such fail to be part of a true ecology, which for Ingold is a co-responsive movement within meshworks and along lines of becoming. Ingoldian agency is thus limited to organisms-in-environments as 'agency calls for skill, and skill arises through development' (Ingold 2011, p. 94), which in turn implies that their movement is coupled to perception. Ingold (2012) proposes an 'ecology of materials' that recognises the open-endedness of both skilled, living organisms and 'objects' (as things-in-the-making) as becomings:

The way to bring them together again is to reverse the assimilation of living nonhuman organisms to pseudoartifacts, by raising artifacts to the status of things that, similarly to organisms, both grow and are grown. To do this, however, requires a change of focus, from the 'objectness' of things to the material flows and formative processes wherein they come into being. It means to think of making as a process of growth, or ontogenesis.

(Ingold 2012, p. 431)

Ingold's (2000, p. 172-188) ontology of dwelling – organism-in-environment immersion precedes world-making and involves *enskilment*, all of which are ongoing activities – however, is not without its critics. Eschewing both neodarwinian evolutionism and cultural relativism and aiming to dissolve the nature (materialism, body) / culture (idealism, mind) dichotomy, Ingold's ontology of lifeworlds is supposed to present an alternative to de- and re-contextualised (Western-ontology biased) constructivist representations *of* instead of *in* the world (Knudsen 1998). But this monist, contextualist approach assumes perceptual differences between organisms as well one continuous world they live in without explaining why this would be the case, simultaneously leaving the importance of classification ignored and the problem of cross-cultural translation unresolved. While remaining sympathetic toward his theoretical framework and following Nadasdy (2007), I thus recognise some of the limitations of Ingold's ontology. Although perhaps congruent with indigenous rationalities to a large extent (as in Nadasdy's case of subarctic, 'shamanic' human-animal hunting relations), it cannot fully incorporate them, nor should it replace them. Nor is this frame equally insightful in all settings and for all purposes, particularly when involving intricate technoscientific processes. Hence the continued importance of the STS toolbox. 'Becoming' has itself become a key concept in the so-called animal and species turns and within 'multispecies ethnography' (Kirksey and Helmreich 2010, Ogden et al. 2013), foregrounding 'nonhuman' creatures and naturecultural borderlands and contact zones at the dawn of the anthropocene (see for example Dave 2014, Hustak and Myers 2012, Knudsen 2014, Lien 2015, Maurstad et al. 2013 recently). I build on this movement, taking on board Ingold's (2013a) critique of the fetishisation of 'species-being' (see more in Chapter 1). Yet the idea that everything is 'becoming' is not solely Ingold's; it arises from a long tradition of processual ecology and anthropology.

### Becoming technoscientific postcolonially

Within the young interdisciplinary of STS and its generative interfaces with anthropology (de la Cadena et al. 2015, Fischer 2007), 'what scientists actually do' has been ethnographically analysed since at least the 1980s. In the twenty-first century however, particular 'emergent cosmopolitical technoscientific worlds' (Fischer 2007, p. 573) beyond Western Europe and North America have come to the fore which cannot be satisfactorily understood in

postcolonial relational terms (core-periphery thinking, imperial power relations) only, as they varyingly transform science and policy in specific locales and beyond. This technoscientific cosmopolitics requires ‘viewing the development of science and technology in a global – political, economic, material, and network – context rather than in simplified chains of histories of ideas within disciplines’ (ibid., p. 576).

Although postcolonial studies of technoscience are of recent lineage (Anderson 2002, Anderson and Adams 2008, see references cited in Lin and Law 2015), it has become clear that ‘[t]he history of almost all modern science [...] must be understood as “science in a colonial context”’ (Seth 2009, p. 374). In this respect, the heterogeneity of the anthropology-STS interface is itself instrumental, decentring or alternatively ‘provincialising’ Anglo-European domination and its exceptionalist conception of *anthropos* (de la Cadena et al. 2015). This has been the main effort of ANT from its outset: to give non-humans a new and fair place in society, seen as an on-going assemblage of heterogeneous bundles. We are all cyborgs (Haraway 1991). Herein lies a possible contribution of STS (Latour 2000, see also Farquhar and Lock 2007). In applying the principle of symmetry between the material and the social, my research can go beyond the artificial dichotomy between fetishes and (social) facts (Latour 1996). In accordance with ANT (Latour 2005), I consider Tibetan medicinal plants not as inert objects on to which meanings are projected, but as mediators that continuously transform and are transformed by the relational webs in which they are located. Observing the ways they enrol each other as well as other actors grants a unique insight into their dynamic and conflicting roles in the flows of materials, meanings, values and knowledge that coproduce Tibetan medicines. Moreover, by performing STS through Tibetan medical terms (following the work *with* Chinese medicine of Law and Lin 2015; Lin and Law 2014, 2015) I strive to decentre Anglo-European technoscience linguistically and conceptually.

#### Becoming in practice: after the ontological turns in STS and anthropology

After taking material and postcolonial turns, I now come to the ontological turn which recently gained momentum in STS (Jensen 2004, Woolgar and Lezaun 2013) and



anthropology (Kelly 2014, Kohn 2015). In both fields this turn has been thoroughly and repeatedly criticized to the extent that both disciplines have definitively moved beyond the initial euphoria (see for instance Aspers 2015 and Sismondo 2015 for STS, and Bessire and Bond 2014, Hornborg 2015, and Vigh and Sausdal 2014 within anthropology). This is not the place to rehearse the many arguments for and against an ontological approach (see more in Chapter 4). However, I do want to indicate here briefly how an ontological sensibility contributes to my eclectic theoretical framework.

Firstly, although I personally identify with Ingold's beautifully elaborated ontology of dwelling as well as, similarly, with Pickering's (2009) ontological vision (and concomitant politics) of symmetrical, decentred, temporal and open-ended becoming, I have to concede that these (differing) definitions of reality are not necessarily commensurable with the emergent realities I encounter 'in the field'. By studying realities through reflexive and messy immersion in human-world engagements – indeed never fully leaving the human behind – through a broadly conceived nonreductive ontological anthropology (cf. Kohn 2015), I can instead discern how ontologies are enacted practically in specific locales. That is, conducting an ethnography of becoming, an ontography (Lynch 2013), as part of the more than three-decade old empirical ontology tradition of STS (Law and Lien 2013). In this respect, Ingold's framework remains useful as a heuristic, not as something to be rigidly enforced. Multiple epistemologies and ontologies are implicated in the technoscientific becomings of Tibetan medicines, and it is exactly their interaction, merging and clashing that is of interest to me.

### Outline of the dissertation

In the next chapter I lay out my methodology, which builds on multi-sited and translocal, para-ethnographic, and multispecies inputs and also covers ethics, reflexivity and a listing of data sources and analyses. The main body of this thesis consists of six chapters, grouped into three larger parts: Plants (I), Becoming (II) and Medicines (III). Part I considers Tibetan medicinal plants before they are processed to become ingredients in pills, and starts off with a chapter (1) which introduces the four central plant actors of my thesis as they are

conceived at Men-Tsee-Khang and PADMA. Through a comparison with classical and contemporary written sources, I show that the commensuration of idealised identification, naming and classification practises of botany and Sowa Rigpa leads to a distorting and politically problematic simplification and solidification of the multiple, dynamic and complex identities of *men* by ignoring the situated nature of these knowing practices. Next, (2) I trace these medicinal plants as they are traded in Indian markets, arguing that the labyrinthine conditions of their sourcing and the evocation of discourses of illegality by both traders and regulators is symptomatic of the failed formalisation of the ‘herbal sector’ by state policies and bureaucracies. After these commodities arrive on the exile-Indian and Swiss factory floors, they transform again as they formally become (part of) medicine (Part II). Industrial pharmaceutical production is as a craft, an enskilled material process of growth involving human-machine-plant meshworks (3). Scientific quality control in the laboratories of both institutions (4), however, redefines the qualities of Tibetan medicines pharmaceutically while also evidencing historical exchanges between ‘Tibetan’ and ‘Western’ practices as well as their ontological fluidity. Even ostensibly ‘finished’ recipes and pills – containing several of my plant subjects – continue to be transformed and reformulated (Part III). In Chapter (5), differing conceptualisations of safety, efficacy and toxicity are found to impinge on the composition, production and prescription of a particularly popular and potent Tibetan medical formula named ‘Garuda-5’, presented as *khyung-nga* and *Grippe-Formel* (Flu Formula) at Men-Tsee-Khang and PADMA respectively. Focussing on another medicine traditionally named ‘Camphor-25’ (*gabur-nyernga*) and marketed as PADMA 28 in Switzerland (6), I analyse how European and national regulations and politics have determined a series of innovations and reformulations leading to a PADMA 28 product family of similar but non-identical products. This final chapter also recapitulates the transformations revealed in the five previous chapters, adds a final layer of reformulation, and thus synthesises the overall argument of how Tibetan medicines can become ‘alternative pharmaceuticals’ through technoscientific practices for the case of PADMA. In the Conclusion, I summarise some of the main contributions of my work in the light of key authors.

# A METHODOLOGY OF IN-BETWEENNESS

If anthropological research is a craft (Bernard 2011; Epstein 1979; Ingold 2013b, p. 4), then its practitioners are continually gaining expertise by cultivating their skills; they are becoming anthropologists. Fieldwork is fundamentally liminal (Jackson 1990): a temporary, emotionally charged ambiguous state ‘betwixt and between’ cultures and places, involving seclusion, role reversal and all the other familiar characteristics of rites of passage. In this transition, methods and field notes in particular mediate between these worlds and identities, and between observations and the ethnographic text they come to be partially reflected in. In Tibetan Buddhism any state of in-betweenness may be called *bardo*<sup>8</sup>, and is said to offer an opportunity for spiritual insight. As I will show in the following chapters, both the plants I follow in their transformation into medicine, and the two main institutions where I conducted fieldwork, can equally be approached as liminal entities. To grasp their intermediate nature, I need to rely on methods which themselves are able to straddle the divides between ‘here(s)’ and ‘there(s)’ and between humans and ‘nonhumans’. I also have to reflect on my ethical obligations in this translation exercise, and on the cultural and identity politics on which my positionality as a researcher is premised. Lastly, I summarise the data sources I collected as a basis for this dissertation.

## Refunctioning and re-envisaging ethnography: multi-sited, multispecies and beyond

The definition of and relationships between ‘space’, ‘identity’ and ‘culture’ are not to be taken for granted (Gupta and Ferguson 1992). The notion of space as a neutral grid onto

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<sup>8</sup> *Bardo* most commonly refers to the period between death and rebirth as described in the so-called *Tibetan book of the dead* (see Fremantle 2001), but is also applied to other suspensions of ordinary consciousness such as during meditation and dreaming. In its subtlest form, it includes every continuous moment of existence as the present is always suspended between past and future.

which difference, memory and social organisation can be projected in a way that nation-states or ethnic territories seem to encapsulate culturally unitary groups is flawed. Instead, the identity of a place emerges through spatialised and hierarchical relations which contingently construct locality and community. But although mobility and interconnectedness blur boundaries, *ideas* of ethnically and culturally distinct places nonetheless remain salient. To problematise the spatialisation of cultural difference which underlies much of the construction of alterity in anthropological writing and to avoid the spatial incarceration of ‘the other’, I turn to multi-sited ethnography. By tracking things (in my case plants-becoming-medicines) the object of study, the ‘study area’ and the argument are all coproduced through a self-conscious association of sites traversed by the ethnographer, crosscutting the local/global dichotomy (Marcus 1995).<sup>9</sup> This mobile mapping strategy decentres naïve identity politics, refraining from linear and bounded spatiotemporal comparisons. Nevertheless, it does retain an inherently comparative dimension through its emergent methodological design of ‘juxtapositions of phenomena’ (ibid., p. 102), on which I capitalise in this thesis.

Men-Tsee-Khang in India and PADMA in Switzerland are spatially distinct organisations, even though they have complex transnational histories and multinational operations. But I manifestly do not consider them to be unrelated, nor part of a single overarching ‘world system’. In this sense it is better to use the term ‘translocal’ as it emphasises linkages between locales (of which no complete, holistic understanding is posited), whereas classical comparative studies relied exactly on the absence of such connections (Hannerz 2003). As the plant-medicines which I keep in focus are mobile and transient, the ‘sites’ constituted by this tracking – including those constructed outside these institutions, for example in herbal markets in India – may themselves be considered short-lived phenomena. Translocalism thus somewhat undermines the ability for – but also the validity of – classical, romanticised notions of fieldwork and participant observation while foregrounding the suitability of interviewing and other less-deeply immersive engagements (at least

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<sup>9</sup> Tracing the production and circulation of things is not novel, as Marcus (1995) already notes. It has long been suggested as a strategy for commodity chain analyses, in Appadurai’s (1986) *The Social Lives of Things*, and in STS and particularly ANT, amongst others, including migration studies.

temporally, but not spatially). Ethnography remains ‘an art of the possible’ nonetheless: partial, pragmatic and practical (Hannerz 2003, p. 202-203), as is ‘being there’ and becoming an ethnographer.

I contribute to the heterogeneous body of second-generation multi-sited ethnography (Coleman and von Hellermann 2011, Falzon 2009), attending to several of its most-criticised characteristics. These include a lack of self-critical reflection on its application and on methodological decisions on locations to be covered, as well as lack of depth and ethnographic responsibility. I am aware that the ‘following’ metaphor appears to imply a pre-existing field and submission to a laid-out track rather than active co-production. Indeed, it may seem as if I am merely tracing some medicinal plant commodity chains from harvest to production to consumption. However, I not only question the singular identity of the things I am following but equally the existence of neatly organised supply chains, attending to the fundamental transformations and multiple reformulations of these healing substances-in-the-making and thus frequently losing track(s) altogether. I also follow the more recent methodological tendency to foreground the generative problematics (or ‘frictions’) of collaboration (Coleman and von Hellermann 2011), creating multi-*sightedness* through para-ethnography together with reflexive ‘subjects’ or better ‘epistemic partners’ (Holmes and Marcus 2012). The latter approach is particularly suitable for application in contemporary organisational contexts such as PADMA and Men-Tsee-Khang, as professionals at these workplaces are not only familiar with academic theorising but also act as self-conscious, strategic cultural analysts and theorists themselves (cf. Islam 2015). Giving due credit to this internal critique distributes authority and thus decenters the researcher, opening avenues for collaborative critical reflexivity. Challenges of para-ethnography include the tendency to disregard low-service jobs, the risk of adopting of elitist managerial ideologies, and the loss of a clear researcher standpoint. In chapter 3 on medicine production, I explore these methodological conundrums further together with PADMA’s CEO Herbert Schwabl.

From the tracing of things through places it is not such a big leap to come to multispecies ethnography, which is inherently a multi-authored collaboration if one thinks imaginatively with and through nonhuman organisms and their ways of life (Choy et al. 2009). Multispecies methodologies, however, are still in their infancy and therefore often transdisciplinary, innovative and experimental. The Matsutake Worlds Research Group just cited for instance, is a cooperation involving joint multi-sited fieldwork and writing inspired by a Deleuzian rhizomatic, non-arborescent ‘poetics of the ontology of multiplicity’ (ibid., p. 384) which mimics matsutake sociality in resisting hierarchical and reified nature/culture divisions. Accordingly, Tsing (2014) contends that social scientists can learn about entangled more-than-human socialities by performing ‘critical description’ at the intersections of natural history and ethnography, through attention to heterogeneous assemblages (such as landscapes or bodies) and (plant) bodily form as materialisations of social relations. In this she aims to go beyond human- and technology-centred treatments of things as tools as conceived in Latourian ANT, instead attending to the interaction of multiple, dynamic, contingent histories in which humans act as decentred participants. In my ethnography centred on Tibetan medicinal plants – perhaps then better called a ‘plantography’ – which (or who?) do often exhibit a tree-like (modular, but indeterminate) morphology around a central axis of directional growth, I am of course not forced to think in terms of dichotomous branches. Paying close attention to their materiality from an Ingoldian perspective and to the meshworks in which they are entangled, I consider *materia medica* as biocultural becomings with varying degrees of aliveness and not just human artefacts. Following Ogden et al. (2013), to attend to multispecies contact zones and especially the companionship, mutual ecologies and domestication inherent in human-plant intra-actions, speculative modes of wonder-full inquiry and writing are in order.

However, Ingold has critiqued not only ‘multispecies ethnography’ (2013a) but equally the current obsession of anthropologists with the term ethnography more generally (2014). He argues that ‘ethnographicness’ has been much overused and conflated with fieldwork and participant observation or ‘thick’ description, devaluing the whole discipline and its public voice. Ingold calls for a return to an undivided anthropology that is not split into ethnography (reality) versus theory (imagination), moving away from popular stereotypes

of the ethnographer as a retrospective chronicler of disappearing lives and connoisseur or trader of exotic insights, and back to thinking *in* and not *of* the world as future-oriented correspondent observers. Nevertheless, in straddling the boundaries to STS I engage more in what Ingold (2013b, p. 2-4) calls 'ethnographic documentation', which is both empirical and theoretical. The transformative effects of this research project on the ethnographer, his lifeworld and future, are indeed not the centrepiece of this thesis. Secondly, multispecies ethnography is not only found to be nothing new by Ingold, but remains woefully anthropocentric in its terminology and reliance on the species concept. Societies and bodies are themselves always heterogeneous communities of be(com)ings (beings as verbs instead of subjects or selves), not bounded entities. 'Anthropology beyond humanity'<sup>10</sup> is about joining, studying and becoming *with* relationally, not separately. For me, this is also where ontography comes into the picture: the description of the co-production of worlds in practice, collapsing epistemology into ontology. In chapter 4, I draw on Michael Lynch's (2013) ontographic approach to describe the making of objective knowledge on herbal and pharmaceutical 'quality' in laboratories and beyond. By historicising and situating these quality control practices, I show how hybrid ontologies of quality are performed in practice in and between Men-Tsee-Khang and PADMA. The methodological and ethical issues arising in ontological analyses are also considered in that chapter.

### Reflexivity and ethics

According to Marcus (1995), multi-sited ethnographers inescapably become 'circumstantial activists' since this type of fieldwork repeatedly generates cross-cutting and contradictory personal commitments which imply political and ethical self-identification. In different sites the researcher's identity shifts and has to be re-negotiated, a re-positioning which comes with circumstantial affiliations that do not fit with traditional idea(l)s of anthropologists as representatives of certain peoples. These partial responsibilities or 'complicities' (Marcus 1997) alert us to the heterogeneous and multiple politics of (the creation of) location,

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<sup>10</sup> Kohn (2014) also recently shifted from 'an anthropology of life' – which predictably distinguishes between human and nonhuman, and between biology and geology in a Western modern way – towards a more open-ended 'beyond the human', which could include non-semiotic 'non-living' realities.

where both fieldworker and participant are always partially anxious outsiders. Such a project is invested with postcolonial and political-economic power differentials, but the configurations of these complicities – and the relevance of the metanarratives of colonialism and capitalism on which they rest – cannot be determined *a priori*. Rather, in multi-sited research ‘the context’ is co-produced along the way. The flows, counter-flows, and frictions within, between and beyond PADMA and Men-Tsee-Khang are not that easily enframed despite obvious intersections. It requires creative and imaginative labour on behalf of both writer, reflexive participants, and the reader (to a lesser extent, I hope) to envision how a Swiss pharmaceutical company and an exile-Tibetan educational institute become ‘Smallalternative Pharma’.

Doing research and writing about methodology is inherently reflexive and raises ethical issues, and so does conducting multi-sited, multispecies (and ontographic) fieldwork. In a postcolonial, postmodern and post-structural vein, anthropologists recognise that the power of the authorial voice and the inevitable distortions of personal and disciplinary histories are reflected in ethnographer-‘informant’ interactions and have inseparable political and moral implications (see Davies 2008). Self-reference, however, can easily turn into self-absorption or on the other extreme, a mere disclaimer statement made up out of sociological categories: I am a Generation Y upper-middleclass (bourgeois?) able-bodied white male (queer, but this was muted during fieldwork) North-Western European (Flemish Belgian with a Dutch father) Tibetan Buddhist (with a Christian, pseudo-secular upbringing) biologist and ethnobotanist. This incomplete, annoying listing of seemingly inescapable classifications does not in itself add or detract much from my arguments. It is not particularly profound or revealing, but it does at least partially explain my interest(s) in plants and Tibetan medicine. As Lynch (2000) notes from an ethnomethodological perspective, reflexivity is unavoidable and ubiquitous and should not be considered to be an independent methodological act or virtue. I concur with this deflation of (radical) reflexivity to escape from *ad infinitum* house of mirrors reflections and *ad nauseam* discussions of the ‘crisis of representation’. But perhaps it is worthwhile noting here that my Western (and perhaps even modernist Buddhist, cf. McMahan 2008), materialist, scientific and botanical background not only determined the object of study but also to a



certain extent my choice of theoretical frameworks and of course my conclusions. As such, my interest in technoscientific practices and reliance on Pordié and Gaudillière's (2014a) reformulation regime do not just reflect their contemporary relevance but have the potential to underwrite the scientisation and pharmaceuticalisation of Tibetan medicine. Nonetheless, I acknowledge the need for a nonsecular medical anthropology (Whitmarsh and Roberts 2016) as well as the complex and dynamic position of Sowa Rigpa 'in between medicine and religion' (Adams et al. 2011a). Anthropologists and (ethno)botanists are indeed already implicated in the reformulation of Asian medicines (as noted by Ganguly 2014 and Gaudillière 2014), which shifts the focus away from the clinical encounter by conceiving an independent herbal industry. On top of that, the positive valence I place on 'alternative pharmaceuticals' – notwithstanding crucial tensions – also betrays my support for the political plight of heterodox practices and substances for health and wellbeing in Europe and beyond.

In the same way, ethics is part and parcel of the research process. Referring to professional codes of practice such as the UK Association of Social Anthropologists (ASA 2011) and the International Society of Ethnobiology (ISE 2006, with 2008 additions) is not sufficient, neither is the creation of a detached and self-serving moral high ground. The ASA emphasises the varied settings in which anthropological scholarship occurs and the responsibilities towards multiple stakeholders (including firstly research participants but also employers and funders, colleagues, governments, and the wider society), leading to conflicts of interest. It urges to anticipate problems and prevent any harm, acknowledging the long-term, open-ended and flexible nature of fieldwork and participant observation. 'Advance consent' is prioritised as an iterative, contingent process of negotiation while recognising the unsuitability of bureaucratic forms in many contexts. The ISE's ethnobiological code of ethics equally foregrounds 'educated prior informed consent' as well as traditional resource rights, biocultural heritage and principles such as supporting indigenous research and the 'dynamic interactive cycle' of communication, feedback and implementation. Prior informed consent is difficult to implement as many factors are unpredictable and potential risks cannot all be foreseen, and since it requires cross-cultural communication and translation in a power-laden matrix (Alexiades and Peluso 2002).

Consent as a cultural category is somewhat arbitrary, indicating the limitations of ethnocentric approaches aiming 'to educate' non-homogenous 'communities' who may have different (non-contractual) notions of trust and exchange. The rise of the informed consent doctrine in anthropology (only embraced by the American Anthropological Association in the 1990s) is predicated on post-war ethics reforms, particularly in experimental human subjects research, and built on the ideals of free choice and the rational, autonomous individual (Bell 2014). Nevertheless, Bell argues for resisting the commensurability of informed consent, its conflation with research ethics, and the positivist assumption of a unitary neutral standard. Re-inscribing inequality by creating voluntarily submissive subjects, it can even minimise responsibility and is therefore deemed fundamentally inappropriate to grapple with the complex ethical dilemmas underpinning anthropological practice.

'Gaining access', or rather, establishing and maintaining meaningful working relationships

Space restrictions prevent me from telling the whole story of how I got in touch with and was eventually able to move through both Men-Tsee-Khang and PADMA more or less freely: making fieldnotes, taking photographs and recording conversations. First encounters with the former institution involved attending lectures by deputed *amchi* in Europe (starting with the late Pema Dorje, at the London School of Oriental and Asian Studies, 6 December 2012), interviewing practicing Tibetan doctors who studied there (e.g. Tamdin Sither Bradley, Essex, Audio recording 4), and following consecutive five- and ten-day introductory courses on Tibetan medicine at Men-Tsee-Khang College (16 September – 1 October 2013). At a meeting afterwards with one of the teachers from the Materia Medica Department, *amchi* Tsultrim Kalsang, I offered my help in editing the botanical names and English in his book manuscript on the cultivation of Tibetan medicinal plants. This eventually resulted in the publication of his book (Tsultrim Kalsang 2016), and is still ongoing in virtual exchanges of expertise. As my spokesperson, he facilitated an officially-sanctioned collaboration (see the Circular of 17 March 2014 in Appendix I), in which I taught Tibetan medical students botany and staff English on a weekly basis – a stimulating, yet

demanding task – in return for access and interview time with people working in the Materia Medica Department, the Pharmaceutical Department ('the pharmacy'), the quality control lab, and the branch clinic of Gangchen Kyishong (Gangkyi). The promised outcomes of my work there ensure a continued relation beyond the scope of my PhD.

In a similarly stepwise manner a *modus operandi* was agreed with PADMA. Following an initial phone call with its owner and CEO Dr Herbert Schwabl (Diary, 14 February 2013), a first two-day visit (8-9 July 2013) and more interviews during the International Congress on Traditional Asian Medicine in South Korea we both attended (ICTAM VIII, 9-13 September 2013), Herbert soon became much more than a 'gatekeeper' or 'key informant' (see especially Chapter 3). Over time, mutual understandings were formalised in a secrecy agreement (see Appendix II) aimed at safeguarding the confidential information I would obtain at PADMA in the unlikely case of 'breach of contract'.<sup>11</sup> I also aided PADMA with some translation work and other small things, but this clearly does not weigh up to the help and support I received from them. Interestingly, at both places it was the institutional context that instigated the need for formal documentation. Besides these forms (and initial University of Kent ethical and health and safety assessments), no further written agreements (including consent forms) were deemed appropriate at the individual, personal level and beyond the precincts of these institutions. In terms of plants, I also decided not to collect herbarium specimens – relying instead on photographic vouchers – to steer clear of the murky waters of bioprospecting/biopiracy. My field notes and diaries are kept strictly private and sensitive data are withheld from publication (sometimes on explicit request by participants). Anonymity was not expected or requested by anyone. To the contrary, due credit is warranted and anonymisation is anyway largely unfeasible in these very specific contexts. An exception to this rule is applied in this thesis to Indian herbal traders (in Chapter 2), who provided details of particularly politically and economically sensitive nature that equally reflect the informal nature of the trade.

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<sup>11</sup> This is only half of the story. Herbert told me, an ignorant doctoral student, that the secrecy agreement also served the purpose of acquainting me with the real-world environment of the pharmaceutical industry.

The influence of my reliance on and rapport with Tsultrim Kelsang and Herbert Schwabl should not be underestimated. These key interlocutors have certainly coloured my overall field experience, but in different ways and to varying extents. *Amchi* Tsultrim was in a less powerful position at Men-Tsee-Khang compared to Herbert at PADMA, which meant that my access to other departments was not directly overseen or mediated by him. This was both an advantage and a disadvantage, allowing for chance encounters but also leaving some doors closed. At PADMA, Herbert personally introduced me to his company in a tour, introducing me to key people and setting the parameters for future interactions. He ensured minimal disturbance of workflow, for instance, yet left the implementation of this to the employees themselves. In the end, it was them who decided exactly what to share and when, after initial clearance was obtained. Throughout my work at PADMA I reported some of my observations to Herbert, who was then able to comment and elaborate, thus shaping my interpretations. This happened to a much lesser extent with Dr Tsultrim, who kept the focus more on his own area of expertise.

### Data materials

My fieldwork mainly consists of extended stays in India (September-October 2013, February-May 2014, July-August 2015) and Switzerland (July and December 2013; January-February, August 2014; July 2016) spread over a period of more than three years, supplemented by a few interviews with Tibetan medicine practitioners and other activities such as lectures and workshops in the UK and the Netherlands. Regrettably, my stay in Dharamasala (less than six months) was not sufficient to master the Tibetan language enough to conduct interviews, intensive immersion courses notwithstanding. Besides (participant) observation in/of plant excursions, herbal markets, medicine production, and quality control laboratories, I also studied and discussed historical and contemporary *materia medica* texts (mainly at Men-Tsee-Khang) as well as archival and regulatory documents (mainly at PADMA). I filled eleven small notebooks, typed almost two hundred pages of diary, captured 118 audio-recordings (about 140 hours in total, averaging 1 hour 12 minutes per recording) of which 56 in Switzerland, and made about 4,000 photographs in India and 1,500 in Switzerland. Only 27 recordings are with female participants, mirroring

a gender bias within Men-Tsee-Khang (especially in the pharmacy and Materia Medica Department) and in Indian herbal markets in particular (where all traders I worked with were male). The relative importance of interviewing is a characteristic of multi-sited fieldwork (Hannerz 2003), whereas para-ethnographic tendencies are clearly visible in the number of conversations with both Herbert (28) and Tsultrim (16). Finally, I also collected, photographed and labelled about fifty plant and medicine objects: predominantly Men-Tsee-Khang and PADMA medicines and other products, but also market samples of my study herbs. Qualitative data analysis, including audio transcription and inductive coding, was carried out using QSR Nvivo 10 following a thematic narrative approach. Most of the interviews were carried out in English, both in India (where it is an official language, taught to Tibetan exiles) and Switzerland (where it is important for scientific and business communication). A Tibetan-English interpreter – Dr Penpa, himself an *amchi* and pharmacy expert – was only deemed necessary in two instances: when talking to the Head and the ‘Store In-charge’ of Men-Tsee-Khang’s pharmaceutical department. German was spoken in less than ten audio recordings, and was then transcribed verbatim.

PART I

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PLANTS

# 1 Commensurating situated knowledges: Sowa Rigpa and botanical taxonomy

After having decided that I definitely wanted to focus on the transformation of a handful of plants into Tibetan medicines, one of the first steps in planning my dissertation was to answer the following question: what are the plants I am studying? This question has stayed with me ever since. At the moment of writing it is still not fully resolved, and I very much doubt it will ever be. The aim of this chapter is to explain why this is the case. Incidentally, this penchant for accurate botanical identification and naming reflects a personality clash within the author's mind: between the academically trained biologist and ethnobotanist, the student of Tibetan medicine, and the budding reflexivity and sociocultural sensitivity of an anthropologist.

*Amchi* Tsultrim Kelsang, *amchi* Ngawang Jinpa and I had arranged to go on a fieldtrip to look at plants (Diary, 26 April 2014). Starting off from the Main Square in the morning, we followed part of the gravel road from McLeod Ganj to Dharamkot, from which we diverted to hike the trail towards Triund Hill. It was not our intention that day to reach the ridge overlooking the Dhauladar mountain range at about 2,800 meters' altitude; we had departed too late for that anyway and did not want to reach the snowline beyond which only very few plants would be in flower. The sky was nearly cloudless the whole day and the sharp sunrays pierced our skin and eyes. It was hot and all three of us were sweating and breathing heavily while walking uphill. Somehow I had romanticised going on a fieldtrip with a Tibetan doctor. The reality was certainly not disappointing, but it was not completely new to me either. I was surprised by how much I could contribute to the on-going conversation: by giving scientific names, describing plants, and commenting on ecology. Tsultrim, the deputy head of Men-Tsee-Khang's Materia Medica Department, was keen to hear this. He said it was good for him to get the right botanical names from me. Using this

he could find out the Tibetan names for the species and learn more. ‘You are a botany expert’, he declared. We both knew this was an exaggeration and laughed, ‘maybe in ten years!’. I had just studied a copy of the well-known field guide *Flowers of the Himalaya* (Polunin and Stainton 1997) that I had picked up at a bookshop in town. Along the way, I numbered each plant we identified – more than twenty in total – in my notebook (Field notes VIII). Diversity-wise Tibetan medicinal plants turned out to be almost a needle in a haystack on these Indian Himalayan foothills. Tsultrim had warned me Spring was not the best time to see many species, and was joking that the plants I asked about which were not used in Tibetan medicine were ‘poor plants’. They didn’t even have a name, even though the *Four Tantras* (*Gyüzhi*, the fundamental four-volume medical text) expounds that any substance can be used as a medicine once its taste (*ro*), potency (*nüpa*) and inherent qualities (*yönten*) are known. Fieldtrips did not seem to be the right place to discuss these medicinal characteristics at length, however, although the tastes and warming/cooling powers of some plants were mentioned. I realised that Tibetan medical plant classification is selective. Of course, the doctors did know names of plants that were not used medicinally but for ritual, food, or ornamental purposes. Tsultrim could also distinguish non-medicinal species from a genus containing medicinal ones. Often he remembered the genus name, but had some trouble pronouncing it correctly (temporarily confusing *Codonopsis* with *Cotoneaster* for example). Ngawang (stationed at Men-Tsee-Khang’s newly inaugurated Body, Mind and Life Department) did not know any scientific names, but did use some common English names like nettle, which he applied to stinging herbs that were not the familiar European stinging nettles (*Urtica* spp.).

The first plant we stopped for, only a few steps up from the Main Square, was a species of *Clematis* which was now in flower all over Kangra valley. Its Tibetan name is *yimong*, and Tsultrim added that is the white variety (*karmo*), one of three that are distinguished. Close to this vine Ngawang noticed a patch of buttercups (*Ranunculus* sp.). He put a flower head on his tongue, instructing me to do so as well. I hesitated for a second. I knew that buttercups in general are poisonous and therefore ignored by cattle. I do it anyway, and after a few seconds I felt a hot sensation. It explains the name given to it in Tibetan: *chétsa*, literally ‘hot tongue’. Tsultrim added that this plant is *pho rik*, the male type that grows at



lower altitude. We stopped many times along the way to examine plants and to catch our breath: to taste the orange raspberries of *gadra* (*Rubus ellipticus* Sm.), to inspect the deep yellow and very bitter wood of a broken *kyerpa karmo* branch (*Berberis lycium* Royle), and so on. It dawned on me that the differentiation of plant 'types' based on medicinal superiority/inferiority or where it grows, or colours, is not easily equated with intraspecific variation. Tsultrim was using the same Tibetan name for what I considered to be other species or genera. Both doctors were much more hands-on with the plants than what I was used to. Touching and tasting them, breaking off branches, and uprooting whole plants. The root would almost never be diagnostically characteristic for taxonomic identification but it clearly is in Sowa Rigpa, which derives many of its medical substances from underground parts. Sometime later, before lunch, we went around a corner and I saw a large inflorescence with sky blue flowers perching on a steep slope. 'What's that?', I almost yelled, pointing. We were all exalted. Tsultrim started climbing to get closer to take a picture. Laughingly, Ngawang warned him that he had a wife and children. After a few minutes, he finally remembered its name: *jarkang* (literally 'bird leg'), probably a *Delphinium*! Tsultrim was very surprised to find this plant here, not expecting it at such a low altitude. It was his take-home prize (Figure 1.1), to be put in the herbarium.



**Figure 1.1.** *Amchi* Tsultrim Kalsang and the author on the way to Triund Hill, with Kangra valley in the background. The light blue flower is called *jarkang*, a rare species of *Delphinium*. Photograph by *amchi* Ngawang Jinpa, 26 April 2014.

The argument presented here questions the reliability of botanical identification of Tibetan medicinal plants, and aims to reveal its problematic political and practical implications for Sowa Rigpa, its practitioners, scholars and scientists, and for the plants themselves. It concerns studies of Tibetan plant nomenclature (Boesi 2007) and classification (Boesi 2005-2006; Boesi and Cardi 2006; Ghimire and Aumeeruddy-Thomas 2009; Glover 2005, 2010), ethnobotanical knowledge surveys (e.g. Lama et al. 2001), *materia medica* texts and their illustrations (Hofer 2014b), and medical substitution practices (Arbuzov 2010, Dashiyevev 1999, Sabernig 2011). I bring two long-established but somewhat oppositional strands of ethnobotanical research into dialogue: the study of ‘folk’ classifications<sup>12</sup> (which tends to

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<sup>12</sup> Following Casagrande (2004, p. 352) ‘Ethnobiology is the systematic cross-cultural study of how people learn, name, use, and organize knowledge about the biota around them’, while ‘“Folk biology” is a term commonly used by ethnobiologists to refer to biological classification and reasoning particular to cultural groups.’ The designation ‘folk’ however can be interpreted as derogatory because it implies that the classification or knowledge referred to is non-(Western-)scientific. In light of Arthur Kleinman’s (1978) distinction between the popular, folk, and professional sectors of healthcare and the importance of written

generalise along cognitive/linguistic lines), and surveys of ‘indigenous’ or traditional knowledge (which showcase variation and are frequently instrumentalised in biodiversity conservation and development, Nazarea 2006).

Even though there is a general awareness that attributing Latin binomials to Tibetan *materia medica* is ‘complex’, everyone continues to have a go at it, relying on a varied menu of classical and modern sources, personal or consulted expertise, or simply by comparing images somewhere on the internet or with a regional field identification manual. I argue that these acts of translation are fraught with misrepresentation, instability, and concealed ambiguity. These identifications constitute a process of standardisation along modern scientific lines in disguise, a standardisation which solidifies the multiplicity of Tibetan medical plant knowledges into unsuitably narrow and rigid categories while sometimes unintentionally universalising this flawed simplification as the one and only correct identification. In this process I call *commensuration*, the inaccurate translation may eventually replace the translated (perhaps in a future official Tibetan pharmacopoeia, see Blaikie 2015 and Kloos 2013 for Men-Tsee-Khang’s on-going efforts), at the same time denying the legitimacy of regional and local traditions, innovations, and substitutions, as well as flexibility in medicine formulation. I not only draw on postmodern conceptions of local knowledge as dynamic, partial, practical, and also political and contingent on and transformed by ‘extra-local’ influences (Ellen 2006a; Ellen et al. 2000), but equally from Donna Haraway’s seminal paper titled *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective* (1988). Thinking with Haraway allows me to question the objectivity of (White, masculinist, capitalist, militarised) science without retreating into radical forms of social constructivism and historical specificity, which provide accounts of complexity but fail to communicate/translate knowledge across different, politically unequal communities. Instead, she advocates an embodied objectivity that allows for situated knowledge from a particular location as opposed to the ‘god trick’ of universalist transcendence. These subjugated, partial positions are not to be romanticised, they are not innocent but critical, transformative and importantly, grounded.

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texts in (Asian) scholarly – and professional – medical traditions (Bates 1995), the term is better avoided in referring to these sciences in their own right.

Translation from this perspective is always partial and vulnerable, resists the politics of simplification and closure, and is 'about heterogeneous multiplicities that are simultaneously salient and incapable of being squashed into isomorphic slots or cumulative lists' (Haraway 1988, p. 586). The 'object' of knowledge (here 'plants') are envisioned as actors and agents, not as slaves of objectifying scientific authorities.

Feminist science studies have also significantly prepared the ground for posthumanist approaches and the dawn of 'multispecies ethnography' (Kirksey and Helmreich 2010, Ogden et al. 2013). In this burgeoning field, recent discussions on the theoretical worth of 'species' is of particular relevance to my argument. Ingold (2013a) argues for an anthropology beyond the human (along with Kohn 2007, 2013) that steers away from 'ethnography' and scientific species concepts, which both replicate human exceptionalism, foreclosing aliveness as a fluid relational process of multiple, heterogeneous becomings (see more in Chapter 3). Yates-Doerr (2015) raises the same issue. In the anthropological tradition of challenging the smooth translation of concepts from site to site and aware of the dangers of dualistic essentialist discourses that reassert what they supposedly overcome (e.g. 'multiculturalism'), she shows how the category 'meat' defies singular definition in the preparation and consumption of food by Guatemalan families. There are multiple, specific practices making meat come into being that do not depend on knowing its essence (blood) or origins (genetics):

The 'multi' of multispecies ethnography should thus be taken as an incitement to study the multiplicity of ways in which relations emerge – and not the pluralist addition of yet more (given) species to the ethnographic canon. (Yates-Doerr 2015, p. 320)

Conversely, Kirksey (2015) – one of the original proponents of multispecies ethnography – holds that the species concept remains a valuable tool to grapple with other animate beings and even an ethical imperative in today's biodiversity extinction crisis. Taking on Annemarie Mol's (2002) praxiographical method, Kirksey researched what practices scientists use to enact or perform species. He finds that taxonomy nowadays is low-status, low-tech work, especially when involving noncharismatic species. Many taxonomists are self-reflexive and accept the pluralist principle that there are multiple defensible

approaches towards biological classification, as well as the promiscuous realist position that these reality-imposed categories are shaped by economic and other interests. The classical definition based on isolated interbreeding natural populations does not provide much guidance in the huge number of organisms without sexual reproduction for a start, and is anyway difficult to assess empirically. Borrowing from Bowker and Star's (1999) analysis of racial Apartheid categories in South Africa, Kirksey (2015) infers that reality is eminently material and solid, but that it may be torqued:

Torque is generated at the intersection of competing classification projects. As boundaries are enacted, or drawn, these lines can twist objects into new configurations. When categories are aligned, there is no sense of torque or stress, according to Bowker and Star, but when competing classifications pull on populations, these forces can produce novel modes of being over time. [...] Taxonomists, and multiple species of agential beings, can also transform other organisms with their practices of classification, recognition, and differentiation. As new species emerge, they can torque human practices, political and economic systems, as well as ecological communities. (Kirksey 2015, p. 760)

It is exactly this clash of classifications and its twisted outcomes – here in the case of the imposition of botanical species onto Tibetan medicinal plant categorisations – that are of interest in this chapter.

## 1.1 Mixed introductions

It might sound silly to proclaim that I don't know clearly who the main protagonists of this thesis are. How can I then even study them, or how did I even decide to pick these? In this section I show how I ended up focusing on four (though I am not sure about the exact number) plants (a debatable category, but species surely doesn't work), and what went 'wrong' along the way. The problem is not just about figuring out more or less reliable taxonomic identifications. Even when relying exclusively on Tibetan nomenclature and texts one ends up drowning quickly in a sea of mutually irreconcilable names, synonyms, substitutes and descriptions. This section represents my provisional, I must admit somewhat failed attempt to come up with some sort of consensus by relying on available specialised English-language (and translated) publications. I apologise in advance to the

reader for the ensuing quagmire of textual cross-referencing and comparison: it indeed seems impossible not to get lost in translation. Thousands of *materia medica* are mentioned in the literary corpus of Sowa Rigpa, not only in its foundational text the *Gyüzhi* and its many historical and contemporary commentaries but even more so within the vast pharmacological literature, particularly the genre on medical simples termed *trungpé*.

To research possible material (dis-)connections between Men-Tsee-Khang and PADMA and in order to enable myself to observe the plants growing in their natural habitats, I started off my PhD looking for plants (or actually plant parts) used as ingredients by both institutions, and which grow in India.<sup>13</sup> Surfing through PADMA's English language website, I found the package insert of PADMA 28, the company's leading product commercially which also contains the largest number of ingredients.

One capsule contains:

Columbine 15 mg, valerian root 10 mg, D-camphor 4 mg, aconite 1 mg, lettuce leaf 6 mg, clove 12 mg, golden cinquefoil 15 mg, kaempferia galanga rhizome 10 mg, costus root 40mg, Icelandic moss 40 mg, cardamom fruit 30 mg, Bengal quince 20 mg, myrobalan fruit 30 mg, calcium sulphate 20 mg, allspice 25 mg, neem fruit 35 mg, calendula flower 5 mg, red sandalwood 30 mg, heart-leaved sida 10 mg, ribwort plantain 15 mg, liquorice root 15 mg, knotgrass 15 mg.

The product also contains excipients.

Depending on the audience however, PADMA has to resort to different sets of names for its raw materials: trade names when ordering herbs from suppliers and for patients (e.g. *Baldrianwurzel*, or valerian root in English), Linnean binomials in official registration and quality documents (*Valeriana officinalis* L.<sup>14</sup>), or pharmaceutical names (*Valerianae Radix*).

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<sup>13</sup> This is already my first flawed assumption and a first instance of the insidious influence of modern botany. 'Plants' is actually not recognised as a higher rank category in the *Four Tantras*, nor in the seminal eighteenth-century pharmacological text *Crystal Orb* and its auto-commentary *Crystal Garland (Shelgong Shelthreng)*. Instead, groupings such as 'woody medicine' (*shingmen*), 'exudent medicine' (*tsimen*), 'medicine from the plains' (*thangmen*) and 'herbs medicine' (*ngomen*) are used, which can contain what modern scientists would variously label as plant, fungal, animal or mineral products (see Glover 2005). In practice, however, it may be present as a covert category or a rarely used high-level rank, see further discussion in section 1.3.2).

<sup>14</sup> I consciously choose to include the author name abbreviations (at least when first introducing a new species) to acknowledge how this suffix adds another possible layer of confusion (or clarity) to the thorny issue of botanical nomenclature. Author names reflect the importance of personal authority in taxonomic

Commonly traded herbs such as valerian are commodified, which implies the link between trade names and botanical binomials is fixed in commercial guidelines such as the German Code on Foods and Feedstuffs (*Deutsche Lebensmittelbuch*). In relation to quality control, the European and Swiss Pharmacopoeias should be referred to wherein entries are listed alphabetically according to Latinised pharmaceutical (pharmacopoeia) names. At this point there is not much confusion – at least for insiders – as there is a clear, predominantly one-to-one correspondence between the different naming conventions.<sup>15</sup>

I narrowed down PADMA 28's list of compounds by eliminating common culinary spices (cloves, galangal, cardamom, and allspice) as well as other herbs available in large quantities on the European market (valerian, calendula, plantain, liquorice), ending up with the following selection of three study herbs. First of all, aconite tuber (*Aconiti Tuber* in the Product Information File for medical professionals, corresponding to *Aconitum napellus* L.) was of interest due to its renowned toxicity. Secondly, costus root (*Costi Amari Radix*, *Saussurea costus* (Falc.) Lipsch.), since I was aware of its inclusion on CITES, the Convention on International Trade of Endangered Species of Wild Fauna and Flora. And finally myrobalan fruit (*Myrobalani Fructus*, *Terminalia chebula* Retz.), in light of its great frequency and quantity in Tibetan medical formulations, as well as its symbolic role as a panacea for all bodily ailments. I soon realised that these three plants are commonly used in Ayurveda and other Asian scholarly medicines, so I set out to find a fourth one that is not (it may tell a very different story): perhaps a species growing at high-altitude? After scanning Dr Dawa's<sup>16</sup> (1999) *Clear Mirror of Tibetan Medicinal Plants* – Men-Tsee-Khang's most ambitious publication on the subject, and beautifully illustrated with European

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identification. This furthermore reflects the rigour of an academically trained (ethno)botanist with research experience on herbal authentication (van der Valk 2017, in press). When I provide botanical names (although not when quoting other people's identifications), I rely on The Plant List database ([www.theplantlist.org](http://www.theplantlist.org)) for the currently accepted names and their synonyms.

<sup>15</sup> The global correspondence between scientific, pharmaceutical, trade and common herbal names is currently being mapped by Kew Gardens in the Medicinal Plant Names Services resource ([www.mpns.kew.org](http://www.mpns.kew.org)).

<sup>16</sup> Dawa excelled in his studies at Lhasa Mentsikhang (1971-1975), where he joined the Pharmacology Department. In 1980 he attended the School of Botanical Art (Central Health Department, China) to learn about plant biology and the art of botanical illustration. In 1988 he set out for India to meet His Holiness, and to work at Dharamsala Men-Tsee-Khang, where he eventually became the Director for five years (2005-2010). Already in Tibet, he noticed 'the lack of unanimous identification of medicinal plants' (Dawa 1999, p. 25), inspiring him to compose an illustrated book.

herbal-style drawings – I came across *ajak tserngön*, identified as *Meconopsis racemosa* Maxim., although an asterisk indicates the identification is uncertain.

The botanical identification of the three first-mentioned Tibetan *materia medica* was already fixed before the establishment of PADMA AG in 1969, through an intensive collaboration between Karl Lutz (the founder, who at the time was still the head of the Swiss branch of the German pharmaceutical company Schering-Plough) and Peter Badmajew, a biomedically trained physician who had inherited a Buryat tradition of Sowa Rigpa from his father (Saxer 2004). With the help of members from the Study Group for Tibetan Medicine (*Studiengruppe für Tibetische Medizin*, set up in 1965), consisting of a small group of interested doctors, scholars, scientists, and pharmacists, PADMA 28's composition was scientifically translated and finally solidified as it was approved by the Swiss authorities as a medicine. Although the actual process through which these plants were identified botanically may be lost in history (but see more in Chapter 6), the outcome is nonetheless documented. Plants that are commonly used in the pharmaceutical industry are defined in monographs – covering identity, quality, and purity parameters – of national or international pharmacopoeias, which are legally binding publications. However, none of the four study herbs appeared (or appears) as such in the Pharmacopoeia Helvetica (nor in the current European Pharmacopoeia). This implies that PADMA had to construct its own in-house monographs when first applying for drug marketing approval based on the general pharmacopoeia template, and these had to be accepted by the national authority involved. For this process, they could rely on published (ethno)botanical, phytochemical, and analytical books, articles, and manuals.<sup>17</sup>

Referring again to Men-Tsee-Khang sources, Dawa (2009) equates *Saussurea lappa* (Decne.) Sch.Bip. (Figure 1.2) – a valid synonym for the accepted name *S. costus* used by PADMA (according to The Plant List 2013) – with *ruta* while listing eight other Tibetan names. *Terminalia chebula* is *arura*, which has forty-five (!) Tibetan synonyms. At this point it seems

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<sup>17</sup> *Aconiti Tuber* was however listed until the sixth edition of the Swiss Pharmacopoeia in 1971, but later taken out as it was considered 'obsolete' (see Chapter 5).



as if the issue of identification has been resolved for these two plants: a trade name (e.g. costus) is linked to pharmacopoeia name (*Costi Amari Radix*) as well as a botanical name (*Saussurea costus/lappa*), all corresponding with the Tibetan name *ruta*, and PADMA and Men-Tsee-Khang are in agreement. I wish it were always that simple.



Figure 1.2. Dawa's (2009, p. 283) painting of *ruta*, identified as *Saussurea lappa* (Decne.) Sch. Bip. Note the inclusion of the root (the used part), which is generally rare in botanical illustration, as well as the detailed black-and-white drawings of a seed and a floret.

### 1.1.1 *Tserngön*, a prickly herb with a blue flower

A first glimpse of suppressed multiplicity can be caught when we look at *amchi* Dawa's publications (1999, 2009) once again for the remaining two plants. He discusses *Meconopsis aculeata* Royle as a type of *tserngön*, giving the abovementioned name *ajak tserngön* – identified by him as *M. racemosa* – as a Tibetan synonym, but the corresponding scientific names provided are not considered to be synonyms botanically. On page 74 of this entry, he translates and quotes the eighteenth century pharmacological text *Crystal Garland* (note the referral to other plants in establishing an identification):

Its leaf, stem, calyx and fruit are spinous [i.e. prickly]<sup>18</sup> with its growth form resembling that of the yellow *Utpal* [identified as *M. paniculata* Prain in the same volume], and its sky-blue flowers that of the blue *Utpal* [*M. grandis* Prain]. But the flower of blue *Utpal* is tinged with red and is relatively darker while that of *Meconopsis* spp. [his translation for *tserngön* here] is lighter. There are three types of '*tsher sngon*' with similar potencies and characteristics: the one mentioned above [*M. aculeata*] has a hollow, thick and multi-branched stem; the second type [= *M. racemosa* from volume I?] has bigger leaves than the former and a *Za shing* (*Urtica* spp.) like stem with axillary flowers arising from its tree-like branches; and the third type [fits well with the description and drawing of *mugchung denyön* in volume I, another *Meconopsis* sp.] has numerous stalks with no main stem, developing from a single root like that of the poppy [this most likely refers to the opium poppy, *Papaver somniferum* L.].

(Dawa 2009, p. 74)

At this point we have come across three types of *tserngön* corresponding to multiple *Meconopsis* spp., of which two were identified to species level. A third Tibetan name (*mukchung denyön*) is found to partially overlap with the (*ajak*) *tserngön* (*rik*) category or categories. Dawa (1999) further presents us with a translation of an important seventeenth century medical text called the *Blue beryl* (*Vaidur ngönpo*), indicating historical disagreement on its identification (note the complicated cross-referencing):

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<sup>18</sup> The (mis)application of botanical morphological terminology, and not only nomenclature, is another problematic area of translation I will not delve into further. Consider for instance the distinction between a spine, a thorn, and a prickle, depending on from which part of the plant the structure is derived (see Beentje 2010 for example). Similar arguments can be made for other terms such as 'calyx', or even 'fruit'.

Some people call *sMug-chung mdan-yon*<sup>19</sup> as *sMug-chung ber-mgo*. Its growth pattern is similar to that of *Ut-pal* but the flowers are dark purple. It has a slightly bitter taste and is effective in healing fractured skull. Most of the late scholars such as *Zur-mkhar-ba blo-dros rgyal-po* consider *sMug-chung mdan-yon* to be the flower of *Pa-yag* (*Lancea tibetica*) [Dr Dawa disagrees]. But the scholars preceding *rJe-rDa-rma sva-mi* unanimously accept it as a variety of *Tser-sngon* (*Meconopsis* sp.) that grows on high mountains with small sword shaped leaves, slightly brown flower-stalks growing solitary or attached to each other and floral buds entirely covered with spines. (Dawa 1999, p. 224)

Dawa played a key role in an international collaboration between Tibetan doctors and Austrian scientists to jointly document Tibetan medicinal plants, leading to a landmark publication of sixty monographs edited by Kletter and Kriechbaum (2001). Under the entry for *tserngön* two ‘types’ are distinguished based on plant size, flower colour, and leaf shape and size: *gozang* (bigger size), and *gongen* (smaller). This is often glossed as superior versus inferior variety (see Dawa 1999, p. 19), indicating a perceived difference in medical efficacy. These two types, however, do not equate simply with the botanical ranks of variety (var.) or subspecies (subsp.), of which many have also been published within the genus *Meconopsis* (but with varying levels of acceptance; Taylor 1934, The Plant List 2013), and which may or may not be acknowledged as separate entities by *amchi*. In total, more than fifty species are described within this genus, of which forty-three can be found growing wild in China, and twenty-three of which are endemics (according to Flora of China, Wu et al. 1994 onwards). It is also widely acknowledged that *Meconopsis* species can hybridise (as has been put to use in the creation of numerous cultivars). Ecotypes with considerable morphological variation (polymorphism) are likely due to the presence of microclimates and significant barriers to gene flow between populations, especially in high altitude mountainous habitats (see references in Kletter and Kriechbaum, as well as Yang et al. 2012). Kletter and Kriechbaum studied *tserngön* specimens collected at Rothang Pass (elevation about 4000 m, Himachal Pradesh, India), as well as from Jharkot (3500 m, Nepal) and from Lhasa Mentsikhang. The Indian accession was identified as *Meconopsis aculeata*, whereas the samples from Nepal and Tibet were found to be *Meconopsis horridula* Hook.f.

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<sup>19</sup> Or is it *smug chung ‘den yon* (Wylie 1959)? Authors may disagree on spelling and/or (mis)use one or more distinct systems of transliteration and (simplified) phonetic transcription, which is clearly another possible source of confusion.

and Thomson. This yet another species that is linked to this meshwork of Tibetan names in which *tserngön* is suspended.



Figure 1.3. A small sample of *tserngön* from Men-Tsee-Khang's Pharmaceutical Department. It was collected from the cold storage unit on 7 April 2014 by a pharmacy worker, under the supervision of *amchi* D. Penpa and myself. Pharmacy staff barely know and use Latin scientific names, but Tsultrim explained to me that 'In India we use *Meconopsis aculeata*', which is wild-harvested during Monsoon. The scale bar is 1 cm.

### 1.1.2 *Bongnak*: black aconite?

Trying to back-translate ‘aconite’ to a Tibetan plant name is even more problematic, and as such it has become an exemplar of the convoluted issue of Tibetan medicinal plant identification (Aschoff and Tashigang 2004, Sabernig 2007, Saxer 2013). A prominent reason for this is firstly that four colour types of *bonga* are distinguished (Dawa 1999, quoting an anonymous *trungpé* cited in *Blue beryl*): white, red, yellow, and black. Each of these may be divided further into ‘subtypes’, for instance the (again) white, red, yellow and black subtypes of black *bonga* (Dawa 1999, quoting *Rinchen chungpé*). Even though it may seem absurd, this categorisation is relevant in Tibetan pharmacology as different types may require different adjustments of dosage and detoxification processes when compounding medicine. Black *bonga* in particular requires attention as it is both poison and medicine (see Chapter 5), and highly toxic in crude form. Chapter 20 on *the Powers of medicine* in *Gyüzhî*’s second volume states that white, yellow and red *bonga* neutralise poison, and that the yellow and red varieties cure meat poisoning and poisoning by black *bonga* in particular (Clark 1995). In Dawa (1999), *bongnak* is identified as *Aconitum* sp. On top of the Tibetan intricacies, Kletter and Kriechbaum (2001) present the following caveat:

Aconites display a wide variety that cannot be dealt with easily by conventional taxonomy. Thus, they are considered to be a ‘difficult genus’ whose taxonomy has not yet been conclusively studied, even regarding the thoroughly investigated Central European species. Therefore, it is impossible to give definite numbers of the aconite species occurring in a specific area. Of the some 300 species worldwide [Flora of China mentions about 400, of which 166 are endemic], more than 50 have been reported to occur within the areas where Tibetan medicine is practiced [here this refers only to the Himalayas and the Tibetan Autonomous Region]. (Kletter and Kriechbaum, p. 32)

Up to now I have only considered a small selection of authoritative sources based mainly on the applied knowledge of *amchi* from Men-Tsee-Khang in Dharamsala and scientists collaborating with them. To answer how PADMA may have come to use *Aconitum napellus*, we have to look at the literature produced in different regions.

**Table 1.1. Botanical names associated with *bonga nakpo* in six key publications on Tibetan *materia medica*. These works reflect national and regional influences. Seven different names are provided, the first two of which are synonyms (of the accepted name *Aconitum lethale* Griff., The Plant List 2013).**

author	area of influence	botanical identification of <i>bong (nga) nak (po)</i>
Phuntsog 2006	Ladakh, India	<i>A. balfourii</i> Stapf
Lama et al. 2001	Dolpo, Nepal	<i>A. spicatum</i> (Brühl) Stapf
Jamphel et al. 2009	Bhutan	<i>A. laciniatum</i> (Brühl) Stapf
Gammerman and Semichov 1963	Soviet Union	<i>A. napellus</i> L.
Parfionovitch et al. 1992	Soviet Union	<i>A. ferox</i> Wall., <i>A. spicatum</i> (Brühl) Stapf, <i>A. balfourii</i> Stapf
Gawé Dorje 1995	Chamdo, Tibet (China)	<i>A. richardsonianum</i> Lauener var. <i>Crispulum</i> W.T. Wang

These sources at least reach some consensus around the notion that *bongnak* is one or several species of *Aconitum*. It is also clear now that PADMA could have found their species of aconite in Gammerman’s dictionary, which was one of the few sources available at the time and which referred mainly to the Buddhist Republic of Buryatia. But a second look at Parfionovitch’s *Tibetan medical paintings* (1992)<sup>20</sup>, which reproduces, translates and comments on a faithful 1920s facsimile of Sangyé Gyatso’s illustrations – originally created 1687-1703 – indicates there is still more to it. How to make sense of all this?

<sup>20</sup> In both the English version quoted here and the Russian edition (titled *Atlas tibetskoj mediciny*) published two years later, the scientific names were rendered by the Lithuanian pharmacologist and Tibetan *materia medica* expert Donatas Butkus, who passed away in Spring 2016. For *Tibetan medical paintings* (1992), Butkus was only given two weeks’ time to accomplish this task, whereas for the Russian translation the names were cross-checked extensively with Tibetan sources for reliability (Herbert Schwabl, Personal Communication, 18 July 2016).

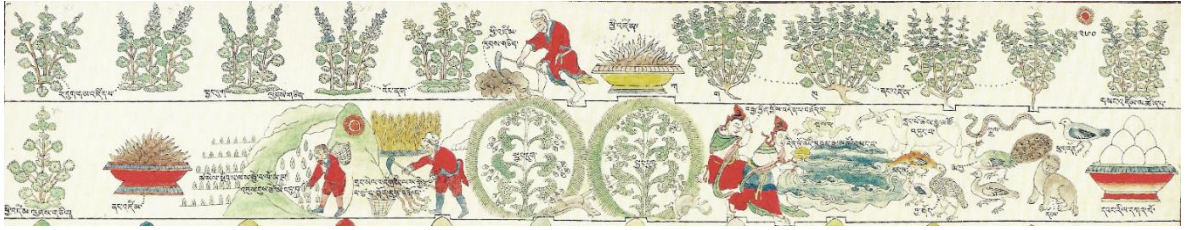


Figure 1.4. Two first rows of the third painting of the Supplementary *materia medica* section, illustrating Chapter 20, Volume II of the *Blue beryl* (Plate 31 in Parfionovitch 1992). The previous painting introduced three types of *bonga* (not mentioning the red variety), whereas here ‘a number of poisonous sub-species of [black] aconite’ (p. 77) are illustrated, among them ‘goatsbane or blue aconite [*ra-dug-gam* ‘dzim-pa, *Aconitum napellus*] in its outer, inner and secret forms [all three identified as *A. ferox*, the secret one also as *Allium microstemon* Bge., with a question mark], wolfsbane [*spyang-dug lugs-gcig*, *A. heterophyllum*], and black aconite’.

## 1.2 Sources of confusion, or evidence of plasticity?

Glover (2010) surmises that the lack of descriptive detail in the *Four Tantras* may have inspired Sangyé Gyamtso to commission the medical paintings presented above, to settle conflicting identifications. This early collaboration between Tibetan doctors, pharmacologists and artists, plus the advice of Nepalese and Indian physicians, aimed to standardise medical substances across the Tibetan plateau and beyond, and subsequently became a template for several – but certainly not all – later works of illustrated *materia medica* (Hofer 2014a). Obviously, historical sources may disagree, as can their contemporary interpreters: practitioners from different places and backgrounds, but also philologists, historians, anthropologists and scientists.

An American biologist named Mia Molvray (1988) put together a glossary on Tibetan medicinal plants, attempting to document regional variation in their identification and adding her own determinations of specimens obtained at Men-Tsee-Khang with the help of *amchi* Jigme Tsarong and Pasang Arya. In her short introduction, she summarises the main sources of what she terms ‘confusion’: (1) local substitutions, (2) the vague nature of Tibetan descriptions and drawings, (3) regional variation in plant use (Chinese, Siberian, Mongolian, Indian), (4) misidentification by *amchi*, (5) different names for parts of the same plant, (6) inaccurate documentation (referring to earlier unprofessional specimen collectors), and (7) imprecise Tibetan spelling (several correct spellings, misprints). I would argue, however, that her negative valuation of variability is itself premised on a more fundamental confusion: the assumption that there is – or at least should be – a

straightforward and ideally one-to-one correspondence between Tibetan and botanical names.

Molvray further comments on one of the early works Bhagwan Dash (1976, Molvray 1988, p. 6): ‘he views the Tibetan plant names as translations or transliterations of the Indian ones – an approach which is valid for his work but may not always be accurate for practical Tibetan medicine’, adding that he did not specify how he got to the Latin binomials. I met Dr Dash in person at his residence in New Delhi for an interview in 2014 (Audio recording 71), and asked him exactly this question. He confirmed that in his view Ayurveda and Tibetan are one and the same tradition in two languages, originating in India; he uses the term Indo-Tibetan medicine to avoid what he denounces as parochialism. To find the corresponding botanical names for the Tibetan names he first back-translated them into Sanskrit, and then consulted modern Ayurvedic compendia such as *Indian materia medica* (Nadkarni 1955) and *Indian medicinal plants* (1994-1996). Later, in Dharamsala, professional translator Dr Gavin Kilty told me he had used the same strategy in his translation of *Mirror of beryl* (finished in 1703 by Sangyé Gyatso, translated in 2010): ‘But no-one is to blame here. It’s an impossible field’ (Audio recording 82). Although he felt uneasy with this method, he saw no valid alternative at the time. In my opinion, this strategy relies on a particularly problematic set of assumptions: that a reliable Sanskrit translation exists (what about indigenous Tibetan plants and names?); that the referent of the historical plant name in *both* traditions has not changed over time (which has been described repeatedly in longitudinal studies on Chinese *materia medica*, see below); that the identities of Ayurvedic and Tibetan medicinal plants can be adequately represented by botanical names (which I question in this chapter); that the actual botanical identification of the Ayurvedic plant is correct; and that regional or local substitution (intentional or not) is irrelevant. Dash might rebuke me, arguing that the raised objections notwithstanding, identification turns out all right in many cases. In his *Materia medica of Tibetan medicine* (1994), he classifies the names of medical materials in three categories: pure Sanskrit forms, Tibetanised Sanskrit (considered the most ubiquitous), and pure Tibetan forms. Throughout the text, equivalents from several ‘authentic Sanskrit texts’ are given when



deemed possible, whereas '[f]orcibly and artificially coining and providing Sanskrit equivalents of the Tibetanised synonyms have been scrupulously avoided' (ibid.: xviii).

Let's have another look at the four plants I am interested in. *Tserngön* and *bongnak* (and their common synonyms) are not represented in Dash (1994). However, '*U tpa la*' – which is often equated with *Meconopsis* spp. (Dawa 1999, 2009) – is translated here as *Nymphaea* spp.: water lilies. This may be an example of a Tibetanised Sanskrit name for a plant that was substituted and subsequently came to refer to the substitute exclusively, at least on the Tibetan plateau (Boesi 2007). Dash (1994) lists '*ha ri ta ki*' (from Sanskrit *harītakī*) as a synonym for '*a ru ra*', which is identified as *Terminalia chebula*. Since it is so commonly used (and traded) for both Ayurvedic and Tibetan preparations, it could represent the least problematic instance of translation of all, a (nearly) perfect match. Still, one has to acknowledge that the distinction of medical varieties (see Figure 2.2), the attribution of pharmacological properties (including taste), indications and formulation do vary considerably, and that substitutes are mentioned in the literature (but seldom used). This global alignment of the results of the varied identification practices in Ayurveda, Tibetan medicine, and modern botany, resulting in equivalence, is rare. It is also limited to the species level only: at other ranks (family, subspecies, etc.) it utterly fails. Fourthly, by looking at *ruta*, we are quickly reminded of the pitfalls of universalism. Dash (1994) aligns it with *Saussurea lappa* (as does Dawa 2009) via the Sanskrit synonym *kustha*. But *ruta* has two types, white and black:

The former grows in *Kham* (Eastern province of Tibet), and is used against disturbed fever and inflammation, while the latter is found as well as cultivated in India, Ladakh, and on high-altitude places near Mt. Kailash; it is fragrant, used primarily in incense and against high *rLung* disorder. (according to the Crystal Garland, cited in Dawa 2009, p. 129)

The white type is ignored and remains unidentified by the last two authors<sup>21</sup>, even though Dawa mentions its existence explicitly. Why? The distinction is important, as each type not only has a different distribution (and thus availability) but also dissimilar indications. Why does Dawa not acknowledge that *ruta* actually means several things, covers several species

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<sup>21</sup> It is however identified and illustrated in Gawé Dorjé (1995) as *Vladimiri souliei* (Franch) Ling.

at least? Leafing through both the works of Dash and Dawa provides a clue: under each plant entry there is only room for one drawing, illustrating one single – never several – species. It reflects the modern Western pharmacological dictum of ‘one name, one substance’ that these scholar-physicians (and many others in their footsteps) have internalised, and which is also increasingly applied to Chinese *materia medica* for reasons of patient safety (Bensky et al. 2004). Referring to the most recent edition of the Pharmacopoeia of the People’s Republic of China (2015), one can fairly easily distinguish between the ‘standard species’ of traditional Chinese medicine, which are included – there can be more than one for the same drug, these are then official substitutes – and non-standard species which are termed customary herbs and often considered as adulterants. A fundamental difference, however, in the case of Sowa Rigpa, is the complete absence of an official, legally binding Tibetan pharmacopoeia. In spite of several more widely disseminated and comprehensive attempts at standardisation (Dawa 1999, 2009; but notably Gawé Dorjé 1995), recent literature within but even more so from outside India and China shows extensive variability in the identification of Tibetan herbs.

The problems relating to the identification of Tibetan medicinal plants have not escaped the attention of Sowa Rigpa scholars and practitioners altogether. Gawé Dorjé for instance is keenly aware of issues arising out of the translation of Tibetan into Chinese terms. Not only are medical theories conflated, the proper identity of plants may also get lost in translation, as he has documented with many examples (Dorje and Gonkatsang 2009). In his view, borrowing terms from a foreign language and ‘rampant copy[ing] from right and left’ (ibid., p. 401) will inevitably lead to corruption over time. On the other hand, he also acknowledges that accurate translation is necessary in order to obtain standard raw materials through international trade. As a solution, he calls for a rigorous standardisation of translations, officially approved and enforced, and for the incorporation of modern biology into the curriculum of students of Tibetan medicine. Barry Clark (2000), a botanist and Tibetan medicine practitioner who studied for years under perhaps the most senior amchi in exile, Yeshe Dhönden, for instance points out the possibility of double substitution: a substitute for an initial substitute of a scarce herb, keeping the same name, eventually erasing the identity of what was originally and subsequently substituted. He explains that

‘the main reason the Tibetans attribute the same name to two completely different plant substances is that they consider them to have the same taste, potencies and properties’ (Clark 2000, p. 56). Interestingly, Clark also mentions ‘flora of the god realms’ as well as celestial animals. In this respect, he wonders ‘[h]ow can one identify the pools of urine left by the legendary snow frog, except from its effect as the supreme aphrodisiac?’ (ibid., p. 57). In this instance, the gap between Tibetan and modern scientific ontologies seems insurmountable. The theory and practice of substitution in Tibetan pharmacy indeed fundamentally challenges the utility of botanical classification for medical purposes, as well the concomitant reduction of efficacy to lists of active compounds (as noted by Schwabl et al. 2016 in their recent conference poster). The Russian philologist Dashiyev (1999) refers to the centuries-old Buryat branch of Sowa Rigpa, which has its own dictionaries of synonyms and formularies alongside the classical Tibetan and Mongolian texts. Dashiyev emphasises the fundamental importance of empirical innovation and the living transmission of knowledge on local substitute plants in Buryat manuscript formularies, estimating that over eighty percent of their ingredients has been replaced, creating amalgams of personal experience and literary classics. Even though the composition deviates to such a great extent, the names of the raw materials and of the formulas have remained unaltered. He warns us that in light of ‘this discrepancy between theory and practice [...] translations of anonymous medical texts outside the context of its contemporary sources [meaning specific reference to its location in space and time] would be a waste of time, generally speaking’ (Dashiyev 1999, p. 4).

Despite these insights, each of the three more critical authors included in the previous paragraph is directly involved in publications where botanical species names (mostly one, sometimes a few, rarely none) are generously provided as correct translations of Tibetan *materia medica*, even if cautionary statements on identifications may or may not be included in the introductions of these works. A historical, text-critical approach to the Tibetan medicinal plant descriptions that fully takes into account the differing opinions of various authors – and more broadly of the two main medieval medical schools, the *Jangluk* and *Zurluk* – is so far lacking in both modern Tibetan and Western scholarship on Sowa Rigpa (Czaja 2013). This equally counts for the distinctive and not rarely contradictory

knowledge traditions of clinical treatises, botanical compendia (*trungpé*) and pharmacy (*menjor*) books. Tibetan medicine should be approached as a multi-layered, diverse and dynamic knowledge 'system' which may not always be internally coherent. This is challenging for Western (ethno)botanists who strive to taxonomically identify plants and their uses, particularly since they customarily do not have the skill and/or interest to do textual comparative work in Tibetan. As a consequence, these scientists frequently rely on modern Tibetan botanical works that provide Latin binomials, even if these are exclusively based on narrow interpretations of a limited selection of canonical Tibetan *materia medica* texts. But as Czaja notes, 'a [Tibetan] doctor would hardly consult a botanical treatise for a remedy to cure a specific disease' (p. 111). Scholars in the meanwhile have realised the need to 'reveal the composite, variegated and dynamic nature of Tibetan medical traditions, and to move away from obstinate (neo)traditionalist perspectives shaped by essentialist religious (Buddhist) and polished monolithic, syncretistic views of Tibetan medicine, standpoints that evolved in Tibetan literature after the establishment of 'orthodoxy' in the 17<sup>th</sup>-18<sup>th</sup> cent[uries] CE' (Blezer et al. 2007, p. 429). Regretably, this aim has not been fulfilled so far when considering plant identification and naming.

Although the deliberate substitution of medical substances (*tsapmen*) is a widespread, extensively documented and historically discussed practice, it is often ignored when it comes to the identification of Tibetan medicinal plants. As we have seen, regional substitutions have been documented as 'geographical bias' and as a source of confusion (Molvray 1988). On the contrary, practitioners not linked directly to authoritative institutions in Tibet and their counterparts in exile are eager to substantiate their claim to authenticity by emphasising the diverse origins and adaptability of Sowa Rigpa to local circumstances. Alexander Arbuzov, a medical doctor who practices Tibetan medicine in St. Petersburg, for instance reiterates in his article on substitutions that 'it would be incorrect to say that, "Tibetan medicine is only for Tibetans" or "only plants collected in Tibet or in the Himalayas are suitable for preparing Tibetan medicines"' (Arbuzov 2010, p. 14). Across the Himalayan range, ethnobotanical and ethnoecological studies have indeed shattered the illusion of one classic literary body implying one uniform, centralised practice (Ghimire et al. 2004, Salick et al. 2006). These studies document the plurality of plant use amongst

practitioners, as well as heterogeneity in environmental knowledge amongst different groups – including lay Tibetan villagers (Byg et al. 2010) – in relation to institutional and socioeconomic backgrounds.

More recent scholarship has further uncovered the nature and extent of substitution practices, especially in the case of rare, expensive, or animal-based ingredients (Blaikie 2015, Sabernig 2011). Sabernig (2011) focuses on a selection of frequently substituted, rare ingredients and notes that they are named in a surprisingly large percentage of recipes in modern formulary books and written on packages of products for sale. Considering the substantial amounts needed, she rightly questions the feasibility of financing and even accessing these materials. Even though Sabernig considers that ‘it is a legitimate philological question to ask what *gur gum* “really” (or, originally) means in the *Rgyud bzhi*’ (ibid., p. 88), in medical practice it may refer to at least four different species, as she documents. In reality, the abovementioned ‘original’ substances are (nearly) always substituted, only used in tiny amounts, or omitted altogether. Again according to Sabernig, the key to understanding substitution practices – and by extension the identity of Tibetan medicinal plants – is unveiling the secret (and multiple) meanings of *materia medica* names, which are seldom explained. Anthropologist Calum Blaikie (2015), in his analysis of the transition of the classical formulation *Samphel-norbu* (*Samnor* in short, meaning ‘wish-fulfilling jewel’) from exclusivity to ubiquity in Himalayan India, takes this argument one big step further. He demonstrates the inherent multiplicity of this medicine, resulting in innumerable *samnor* variants or avatars. In doing so, Blaikie convincingly argues against the view that these multiple versions of ‘the same’ drug ‘represent the corruption of classical purity or inauthentic approximations of a static ideal’ (Blaikie 2015, p. 12). On the contrary, invoking the dynamism of Scheid’s (2007) ‘currents of tradition’, classical formulas can only be instantiated as medicines through contemporary practices and thus as valid but contingent entities. I fully agree with this explicit critique of textual dogmatism, and contend that an analogous argument ought to be put forward for the components of formulations. These ingredients are equally laden with false connotations of stability and consistency across space and time. The preoccupation with weeding out sources of confusion (and diversity!) mirrors and has its roots in the emergence of modern pharmacy

and pharmacognosy, and particularly in the establishment of national pharmacopoeias – based on earlier herbals – within Europe and beyond (see for instance Griffin 2004 for the UK).

Even though the need to create a collection of botanical voucher specimens is indicated in ethnobotany manuals (Alexiades 1996, Martin 2004), it is nearly always lacking in the literature on Tibetan medicinal plants. Notable exceptions that at least mention institutions where specimens may have been deposited are Kletter and Kriechbaum (2001), Lama et al. (2001) and Salick et al. (2006). Chan et al. (2012) have quite recently noted a similar lack of good practice in publications on Chinese herbal medicines, making it impossible to validate identifications. Evidently, '[t]he use of a Latin scientific name does not always imply correct botanical identification since such names can be misapplied' (ibid., p. 471). Despite these 'good practices' there is still considerable disagreement between taxonomists on species delineation, with problematic implications for ecology and biodiversity conservation, and for legislations based on these fields (Isaac et al. 2004). It is recognised that evolution by natural selection spawns a spatiotemporal continuum of variation in/across organisms that is not always suitably captured in separate taxonomical boxes. The dynamics of evolution render taxonomy inherently unstable. The number of described species also keeps growing rapidly which is related to 'taxonomic inflation' (especially in charismatic groups such as primates), 'where known subspecies are raised to species as a result in a change in species concept, rather than to new discoveries' (Isaac et al. 2004, p. 308). This tendency to 'split' taxa into more narrowly defined species, as opposed to 'lumping' previous taxa together under a more broadly conceived name is supported by many researchers nowadays. The debate between splitters and lumpers, however, first became a serious area of contention in the early nineteenth century, when the massive influx of specimens from far-flung colonies challenged the Eurocentric classification system as well its professional institutions both qualitatively and quantitatively (Bonneuil 2002, Endersby 2009). Whereas in the eighteenth century botany was seen as a highly logical and abstract philosophical pursuit that verged towards comprehensiveness, the many disagreements between systematic botanists were now considered an index of low scientific standard compared to mathematics and physics. In an attempt to restore this field as 'natural philosophy' and not

a merely descriptive 'natural history', Joseph Dalton Hooker (1817-1911) followed by other metropolitan professional botanists based at burgeoning herbaria started a crusade against splitters or 'species mongers', mostly referring to non-elite, domestic field botanists and collectors. Hooker created the order needed to revalorise their profession and for the British empire to prosper by propelling Kew Gardens as the imperial metrological centre of a 'world-botany', stabilising taxonomical knowledge through the publication of colonial floras and the *Index Kewensis* (Brockway 1979). Nowadays, with more taxonomists in more countries, plus the internet revolution, nomenclatural change is much faster and the illusion of stability more difficult to sustain despite international collaboration efforts. Taxonomic determinations are only ever provisional in this sense, which is an eternal frustration to non-taxonomists. Surprisingly, Darwin's (r)evolutionary ideas had little impact on Victorian taxonomy at the time. Hooker was one of the first to publicly endorse his friend's theory even though constantly changing species are a nightmare to taxonomists. His support was most likely because evolutionism provided biology with a scientific law, but with no immediate practical repercussions for every-day taxonomic work. In this manner, Darwinism became acceptable precisely because of its conservatism compared to earlier rejected theories. In the case of botany as well, 'the way we classify is ultimately a product of why we classify' (Endersby 2009, p. 1496).

### 1.3 Idealised identification, naming and classification practices

The practices of identification, naming and classification in relation to Tibetan medicine have only been studied intensively by three scholars, as part of their doctoral research: Alessandro Boesi and Francesca Cardi (both in 2004 and at the same university), and Denise Glover (2005). Boesi and Cardi approach the topic from an ethnobiological and ethnomedical angle respectively, while Glover pays more detailed attention to the wider anthropological context as well as to sociocultural influences such as the role of ethnic and linguistic identity. Based on their extensive fieldwork with traditional doctors and laymen in several Tibetan cultural areas of China, India, and Nepal, Boesi and Cardi (2006) have summarised the process of identification, and the features that are generally considered. They distinguish two systems of identification that may take place in succession: 'prototypical' and 'componential-conceptual' (see Boesi 2005 for examples). The first-

mentioned refers to general similarity to an ideal model, while the second relies on more detailed evaluation of specific features in order to recognise the plant. In case of Tibetan medicine, the use of prototypes is rarely sufficient to complete the determination. Relying on his/her education and personal experience as well as explicitly referring to Tibetan pharmacological treatises, the physician takes into account the morphology (with parameters differering from plant to plant), taste, scent, and habitat (e.g. sun-exposed versus shaded mountain flank) of *materia medica*. These authors further note that it is impossible to identify plants *a priori* employing classical texts. The descriptions and illustrations are subjectively interpreted; true expertise only comes after years of guided practice and oral knowledge transmission.

Boesi (2005-2006, 2007) has analysed Tibetan plant nomenclature in considerable detail. He finds that the naming criteria are fundamentally the same as in other 'folk' or 'traditional' classifications, and that it reflects our universal cognitive capabilities as well as local environmental influences and sociotechnical practices. So even though he extensively documents regional and local variability of names (and their referents) and takes into account differences in literacy and (medical) education, Boesi also maintains that the underlying principles of categorisation and higher classificatory ranks are essentially homogenous across Tibetan populations in different countries. Institutionally trained practitioners frequently make use of the standard names from works such as the *Crystal garland* while independent, lineage-based healers draw more from the popular register, the names of which are often also represented in historical texts as synonyms (Boesi 2007). In line with Conklin (1962) and Brent Berlin's (1992, Berlin et al. 1973) ground-breaking ethnoscientific (and naturalist, universalist) classification studies<sup>22</sup>, plant names can be broken down into two elements: basic names (single or compound) and attributes (differentiates plants sharing a basic name). A name consisting of only a basic element is

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<sup>22</sup> Ethnobotany has been preoccupied with issues of plant identification and translation since its beginnings, to be able to establish its basic units of analysis. In the mapping of 'local' or 'folk' categories onto taxonomic science, two opposing stances have been advocated. Berlin and his followers emphasise cross-cultural similarities in the cognitive-linguistic structuring of natural kinds, whereas the relativist stance spearheaded by Roy Ellen (e.g. Ellen 2006b) foregrounds historical and sociocultural variation and embeddedness. Recently, Ellen reiterated that the construction of vernacular classifications by ethnobotanists 'do not conform to any pseudo-Linnean local ontology'. They are rather 'simplified representations drawing on selected features of plants put together in a particular scientific (etic) framework' (Ellen 2016, p. 15).



called a primary name, a basic name plus an attribute is a secondary name. Taking an etymological approach, Tibetans devise basic names grounded on a small series of morphological, biological and ecological criteria, but also on metaphors, plant usefulness, and derivation from other languages, particularly Sanskrit and Mandarin Chinese. Attributes are equally based on plant features (often flower colour, plant size and gender, growing area), metaphor, or related to plant uses. *Tserngön* for instance is explained by Boesi (2005, 2007) as a compound basic name derived from morphological characteristics, namely the prickles that cover stems, leaves, and fruit pods and the blue colour of the flower petals.

Boesi (2005, 2007) repeatedly opposes 'non-modern' 'traditional' societies and modern science. The latter aims to classify each plant as a separate object within the plant kingdom, whereas the former is built to manage daily people-plant relationships in multiple contexts. He adds to this by noting that his informants did not show any interest in elucidating their system in its entirety. Boesi (2005-2006) reports a discrepancy between the more elaborate textual classifications (of ten or thirteen main groups of substances, see Glover 2005 and 2010 for details), and the actual categories that are commonly employed by both practitioners and lay Tibetans in the field. On this practical level, only four or five forms are recognised under 'plants', which is a covert category, unnamed but implied: flowers and grasses (*métok* and *tsa*, also grouped together under *tsa*), woody plants (*shingdong*), woody vines (*thrishing*), and mushrooms (*shamo*). A range of other hierarchical levels is further distinguished, including types (*rik*), varieties (subtypes) and sets (Boesi 2005, 2005-2006). Lama et al. (2001, p. 10), as part of their applied ethnobotany project at Dolpo (Northwest Nepal), report a slightly different *amchi* botanical classification: a 'plant kingdom' is explicitly named and divided into two main lifeform ranks (herbaceous and woody plants), with further subdivisions equally present. This already indicates that it may not be appropriate to generalise Tibetan (medical) plant classifications into one single model.

On that note, Glover (2010) – based on interviews with Tibetan doctors and pile sorting exercises, in Gyelthang (Kham, Western Tibet) – further stresses the complexity and multiplicity of *materia medica* classifications among texts and among practitioners, as well as some remarkable hybridisation with modern (biological) science in contemporary works. These changes include a formal designation for the Linnean plant kingdom as well as the introduction of an overarching tripartite plant/animal/mineral structure, often by the use of neologisms. Efficacy on the other hand is downplayed as an organising principle. In her dissertation (Glover 2005), she underlines the fact that categorisation is equally a product of long-term historical dynamics and not only of recent (modern) aberrations, criticising the privileging of oral knowledge by ethnobiologists over written records. As has long been noted by Zimmermann, in European classical (medieval) texts too '[e]very medicament was covered in adjectives, and it came as no surprise to find in Ayurveda a luxuriance of synonyms, a mixture of wordy empiricism and phantasmagoria, an omnipresent dialectic between contrary qualities' (Zimmermann 1988, p. 198). In Ayurveda this is not mere verbiage however as the literary composition of ancient Sanskrit texts mirrors the very nature of Vedic reasoning, where knowledge transmission proceeded through the recitation of metred word series. In this sense, he argues that the Greco-Latin objectivist and argumentative logic that created disciplines such as physio-logy, zoo-logy and botany is not comparable to the endless use of 'garlands of names' (*nāmamāla*), where each name is a description that adds knowledge and upon which therapeutic tastes and qualities were grafted by means of geographical, agricultural and cooking metaphors. This is also largely applicable to Sowa Rigpa, where students until this day memorise large tracts of the *Four Tantras* as well as commentaries that include long lists of plants and medicines.

#### 1.4 Translation in medical and pharmaceutical practice

Here, I introduce ethnographic vignettes to show how the idealised identification and naming practices summarised in the last section came into play during my fieldwork in Men-Tsee-Khang and at PADMA respectively.

### 1.4.1 In Men-Tsee-Khang

During my fieldwork in Dharamsala in Spring and Summer 2014 I spent most of my time at Men-Tsee-Khang talking to *amchi*, in between teaching classes of botany and English to staff and students as a volunteer. After a while I realised that doctors in each department – be it the Pharmacy, the Materia Medica department, or a branch clinic – have cultivated a different knowledge of plants in relation to their day-to-day job.

Sonam Wangmo (tenth batch Men-Tsee-Khang graduate) has over fifteen years of clinical experience, and on a normal day dozens of patients will come to cubicle C3 in the Gangkyi clinic for a consultation. In between patients, I asked her about plants. Like all other Men-Tsee-Khang medical students, she has memorised large tracts of the *Four Tantras*. She referred me to chapters 19 to 21 of the second volume on the taste, efficacy and compounding of medical substances. Furthermore, in the fourth year of their education, students also have to learn by heart a 100-page booklet composed by Penpa Tsering (formerly lead pharmacist, now running his own private production unit in Dharamsala) that enumerates ninety-five formulations – not specifying ingredients – together with their potency, benefits (*phenyön*) and mode of administration. In the fifth year, a 35-page text containing a list of plant names and types is also memorised separately (originally compiled by Khyenrab Norbu, personal physician of the thirteenth Dalai Lama). On a more practical level, all students – except those in their final, fifth year – take part in a yearly medical excursion of about twenty days in the mountains near Manali during Monsoon (near Mahri, Rohtang Pass, Himachal Pradesh), where they collect and learn to recognise more than a hundred medicinal plants, culminating in an exam. At the college, students are also brought into contact with plants: through photographs on projected slides, with samples in dried and processed form, and by collecting small amounts of live plants growing in the vicinity of Dharamsala. To obtain her *menrampa* degree six years ago, the highest title formally awarded by the Institute through examination and only after ten years of clinical practice, Sonam had to thoroughly revise *materia medica* names, relying on books available in Men-Tsee-Khang's library. Nonetheless, she admitted that if you don't use or repeat these names regularly, after two years you almost forget all of them again. I was curious to know

whether during consultations, when prescribing medicines to patients, *amchi* think about plants and other medicinal ingredients or not.

Ingredients not. Because we have a lot of medicines, the ingredients we don't remember. But hot and cold we separate, we have to. Which medicine is hot in potency and which is cold, according to the constitution and nature of the patient. If they have inflammation, then don't give very hot medicines for the time being. If it [the disorder] is because of cold as well as inflammation, then for a while we can give hot medicine, and then cold medicine. First of all, we think which medicine is suitable for the patient. It is important to know the ingredients inside [the pills], but we forget. (Audio recording 77)

I quickly realised the absurdity of my question. Men-Tsee-Khang produces more than 170 formulations, which are then distributed to the branch clinics. Each of these usually contains five to thirty-five components or more (see for example Tsarong 1986); even expert pharmacologists have to refer to written sources when compounding. In clinical practice, it is the formulas that spring to mind. Sonam had no difficulty at all in listing medicines (together with their uses) that mention the plants I am interested in as part of their name, indicating they are the principal ingredient: *Aru-7* (good for the spleen), *Aru-10* (for kidney inflammation and kidney function), *Aru-18* (lower back pain and lumbar spine problems), etc. For *ruta* she quickly replied with *Ruta-6* (very good for colitis and stomach problems, cramps, helps indigestion) and *Ruta-13* (against *H. Pylori* in the stomach, as well as indigestion). However, *tserngön* and *bongnak* are not directly represented in any formula name even though at least the first-mentioned is a relatively common ingredient, making it impossible for her even to name with certainty a single pill containing this plant without referring to texts.

In the Pharmaceutical Department, practitioners and pharmacy workers come into close contact with the crude (mostly dried) materials on a daily basis, especially during the cleaning and compounding processes. When the season is right, they also go on plant collection trips. Pharmacists equally visit markets, and get samples from suppliers before ordering a new batch. In the store-room strong and large bags made of jute or military canvass are neatly stacked on racks and sealed with cord, each carrying a laminated paper tag with the (only one) Tibetan name of the material, date of acquisition, and its weight (on

average 10-40 kg). The identity and quality of each incoming ingredient is checked by the 'Store In-Charge', who is responsible for the accounting and daily transactions in and out of the storage. He had first joined the pharmacy as a temporary worker on 1<sup>st</sup> December 1989, having come to Men-Tsee-Khang because he was interested in becoming a doctor. But the next entrance exam was two years later, and by that time he was already employed as permanent staff. Together with the lead pharmacologist<sup>23</sup>, Dr D. Penpa, he checks the identity and quality of all incoming ingredients. This is according to their shared experience and based on visual, gustatory and olfactory cues. They do not usually refer to any books. If accepted, a sample is sent to the quality control lab (see Chapter 4), where the established link between the Tibetan name and the material is normally not disputed. In the course of the many conversations I had with Penpa at his office, it became clear that he never uses Latin scientific names to refer to plants or any other organism, even though they could be looked up in publications on his bookshelf. To communicate with suppliers in India, he uses Hindi names such as *hara* for *arura*, and *kuth* for *ruta*. Within the pharmacy, Tibetan names are used. Different Tibetan synonyms for the same plant may be used depending on the context. When I first asked him about *bonga nakpo*, he recognised the name but added that 'here we call it *tsenduk*' (Field notebook VII, 18 March 2014), which translates as 'violent spirit poison'. Nonetheless, the name *menchen* ('great medicine') is more current amongst pharmacy staff, perhaps not to be constantly reminded of its toxicity when handling the blackish roots and grinding them into powder.

Dr Tsultrim, the deputy head of the Materia Medica Department, offered me some black tea laced with milk and sugar. It was 10:30, tea time, we were being served from a big thermos in his office. I wanted to know in more detail what the main role of this Department was.

The Pharmacy and Materia Medica Department's relation is like father and son, very closely related. We have to do the correct identification. This Department has the duty to identify the correct medicinal plant, where it is growing, where it should be collected, and provide

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<sup>23</sup> Jamyang Tashi is the current Director of the Pharmaceutical Department, and Tenzin Thaye the Deputy. They are both extremely knowledgeable on the subject, but have more supervisory, advisory, and administrative roles. Nonetheless, the Director also involves himself directly in manual labour such as cleaning to speed up the work, and in specialised tasks such as detoxification.

this information to the Pharmaceutical Department. The main function is to document the plants mentioned in the texts. There are some pictures drawn by artists, but that is not enough for us also. We have to see and take photos of the plants. Not only the whole plant structure, but also take a picture of the root as well. For example, we have seventy-nine *thangkas* [Buddhist scroll paintings]. These are some kind of illustrations of *Gyüzhi* and also include medicinal plants. But that is not enough. They are drawn by *thangka* painters. They are professional in painting but not in medicinal plants. That is not enough the see the structure of medicinal plants. That's why we are collecting specimens of medicinal plants, and keep these in the herbarium. Then we draw the picture. We have two special artists trained by Dr Dawa. After finishing my book [comparing Tibetan medicinal plants across Indian Systems of Medicine and Chinese medicine, Kalsang 2008] I was working on this project as well. First we have to write it in Tibetan, then after that it is translated. These books are very important. At the moment they are not valuable, but in the future. The important thing is that identification characters are mentioned already in the ancient texts. But additional characteristics are necessary. Former time Tibetan doctors when going to the field, they wrote in poetry form. Not this specific kind, didn't measure the centimetre, millimetre. Just structure a little bit.<sup>24</sup> These additional and more precise and profound characteristics, can be understood by botanists, professionals. [...] And not only that, we are also giving training for local people, local amchis, who don't have knowledge about texts. They have good experience from their father, or who was *amchi* before. But textual knowledge is very rare for them. In the text there are many synonyms, but some names are well-known through the whole country of Tibet. We have to base ourselves on that, and give the right identification to local people. This is our work. (Audio recording 72, 24 March 2014)

The importance of Kletter and Kriechbaum's 'interdisciplinary development projects' in collaboration with Men-Tsee-Khang doctors can hardly be understated. Originally, the intent of researchers at University of Vienna's Institute of Pharmacognosy was to identify a collection of Tibetan drugs obtained by a pharmacy student from TMAI and donated to the Institute in 1972. After a pilot project was started with Men-Tsee-Khang in 1992 (funded by the Austrian Ministry for Foreign Affairs), the major goal shifted to

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<sup>24</sup> Dr Tsultrim later added that one has to differentiate between descriptions by classical Tibetan doctors of plants growing at high versus at low altitudes, the former being much more precise in general. In the past physicians could travel to India, but most often they would only visit markets to buy plants in dried and processed form.

documentation for the dual purposes of preservation and development of Tibetan medicine. A second project was funded by the same body (1995-2000), culminating in a landmark publication:

#### Western Science meets traditional Tibetan Medicine

For the first time, Western scientists and Tibetan doctors jointly document Tibetan medicinal plants in accordance with Western scientific standards and Tibetan traditional methods.

- The data on botany, chemistry and pharmacology represent the Western system.
- The Tibetan plant identification and classification as well as the medical uses of the plants reveal the traditional point of view. (back cover, Kletter and Kriechbaum 2001)

The result was an authoritative, meticulously researched volume that continues to be highly regarded by doctors in the Materia Medica department as well as by scientists in Men-Tsee-Khang's quality control lab, not least because of its integration of perspectives and excellent macro- and microscopic colour photographs. In my communications with Krista Kletter (project coordinator and microscopy specialist), it became clear that Dawa played a key role in facilitating the collaboration, to which he was favourably inclined.<sup>25</sup> She noted that Men-Tsee-Khang at the time was interested in introducing Tibetan medical preparations in Europe, but they were not aware that their products needed to meet European standards. Dr Kletter elaborated that

[i]t was extremely difficult to solve this problem [of differing viewpoints of Tibetan doctors on the correct source], because each doctor was convinced that only he used the proper drug. We explained to them, that it is common practice in science to cite different opinions. We did not judge their information but simply cited them.

(e-mail correspondence, 27 October 2014)

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<sup>25</sup> In what seems to be a reversal of scientific stability and universalism, Dawa (1999, p. 20) contends that 'the scientific names were not added to give a "better" name to the contrary, the timeless correct names are the Tibetan ones. Scientific names are the result of a continuous process called scientific research and thus bound to change if scientific knowledge is proceeding'.

#### 1.4.2 At PADMA

In both Men-Tsee-Khang and PADMA herbarium specimens are present in archives (Figure 1.5), but these are rarely consulted and thus not used for identification on a daily basis. Similarly, both institutions house a library filled with relevant books, including historical and contemporary Tibetan medical texts, floras and field guides, (inter)national (herbal) pharmacopoeias, specialised scientific literature on pharmacognosy, and so on. A subset of these writings do influence identification practices, but only indirectly. In the case of PADMA, each medicinal ingredient – be it in crude or powdered form – is delivered in the warehouse accompanied by documents (the packing list and invoice) that identify the article by name and supplier reference number, and specify the date of delivery, quantity and price. Walter, the warehouse manager, has then to sign for receipt, and to follow and fill in the protocol for the receipt of goods. He checks the weight as well as the number and condition of the container(s), and assigns a new PADMA lot number to the delivery using a printed sticky label. To verify the identity of this particular lot, laboratory staff need a representative sample, for which Walter needs to go through the standard sampling procedure. When the samples reach the laboratory accompanied by the filled-in sampling protocol, Erich (the head of the laboratory) will first register it into the lab software database and print the sample labels (with batch and sample numbers), which will indicate to the laboratory technicians which analytical tests need to be undertaken. One of the technicians (Barbara, Brigitte or Emad) then prints the protocols on which the test results have to be written down. She or he also consults the in-house monograph for that particular drug<sup>26</sup> throughout the analytical process (but large parts they know by heart), which details the steps to be followed as well as the specifications, the range of acceptable outcomes. The full analytical procedure consists of identity testing, purity, and a chemical assay (of essential oil content for instance). Identification is subdivided further into odour, taste, macro- and microscopic characteristics, and finally TLC (Thin-Layer Chromatography).

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<sup>26</sup> The dried and comminuted plant parts that eventually become medical ingredients are generally called drugs (*Drogen*). In their crude form they are referred to as raw materials (*Rohstoffe*), whereas after milling and germ reduction the powdered form becomes an active pharmaceutical ingredient (API or *Wirkstoff* in German). The processing state of the drug is also indicated as part of its pharmaceutical name, for instance *Myrobalani Fructus totum* or *pulvis*, ‘complete’ or ‘pulverised’ myrobalan fruits. These pharmaceutical names, and abbreviations such as ‘*Myrobalani*’ are nearly always used, not Latin scientific names. German equivalents such as *Akonit* for *Aconitum napellus* are seldom used for plants not growing in Europe.



All five of these identity parameters are investigated internally, in PADMA's own lab. The methods and limits used are copied from the European Pharmacopoeia whenever possible, and supplemented with specifics based on secondary scientific literature. For each parameter that is tested, a small quantity of the sample is compared to (the output based on) a reference sample, which generally comes from the last batch of the same drug that was released for production, ensuring continuity.

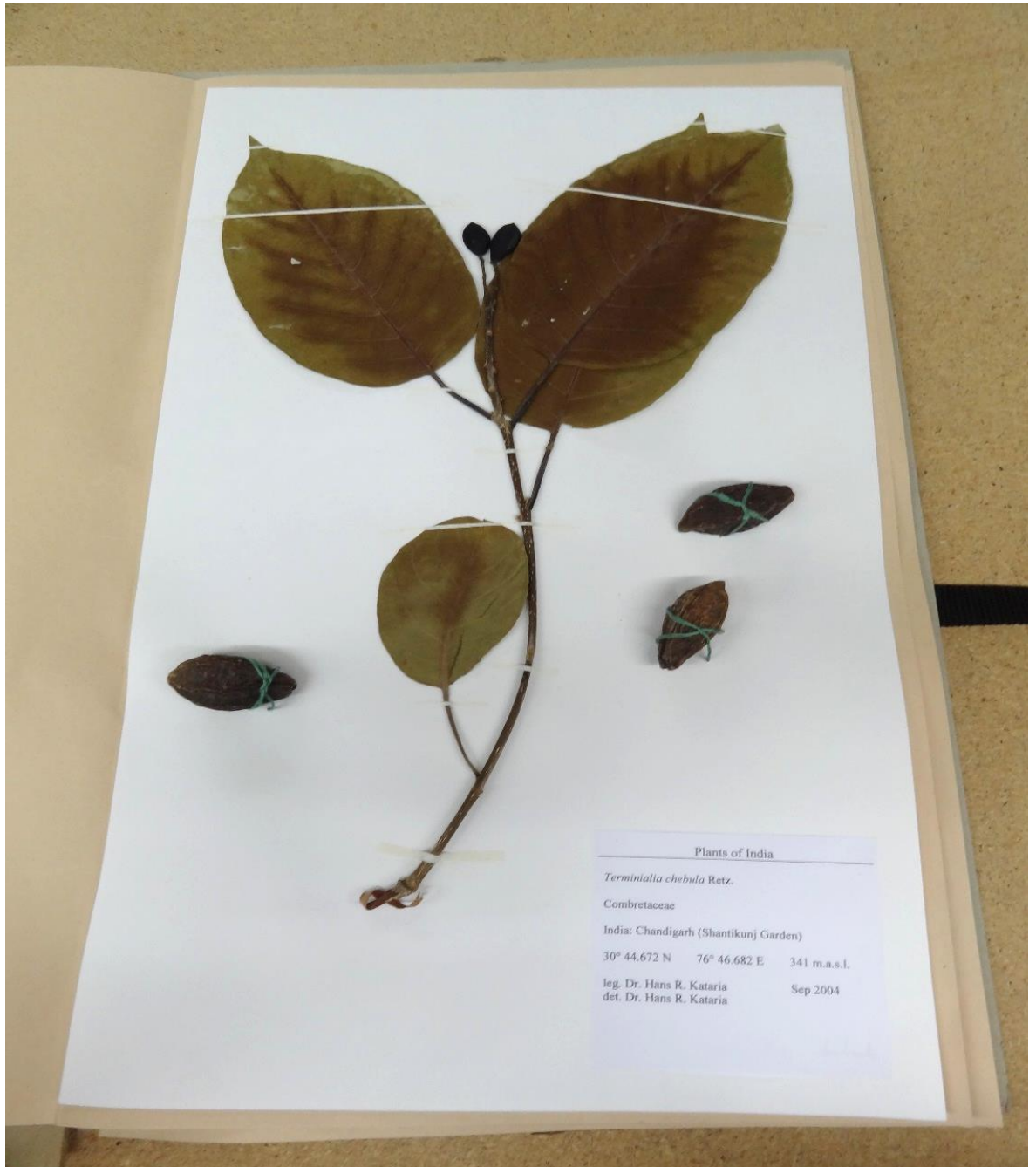


Figure 1.5. A herbarium specimen of *Terminalia chebula* Retz. This specimen, along with duplicates showing flowers, is stored at the archive of PADMA's production unit in Kempten. It was procured to satisfy the Swiss regulatory authority for medical product registration (Swissmedic) as it is the source of an ingredient of PADMA 28 which is currently not described in the Swiss or European Pharmacopoeia.

Not unexpectedly, the words used to describe raw materials in German and English in a PADMA monograph do not necessarily overlap with what is reported in the Tibetan medical literature. The odour and taste of *Myrobalani Fructus* for example has to conform to the following description: ‘characteristic, acidulous (reminiscent of dried figs)’; and ‘acidulous, astringent, slightly bitter’. In volume II of the *Fourfold Treatise*, *arura* is said to have five tastes (sweet, sour, bitter, hot, astringent), excluding saltiness. Dawa (2009, p, 144) mentions ‘bitter, astringent to slightly sweet’, while referring the reader to a much more extensive discussion of *aru* varieties (five to eight) with specific tastes and potencies in *Crystal Garland*. Microscopic examination takes place on powdered material, which needs to show a minimal number of diagnostic criteria including vascular bundle fragments or endocarp stone cells for myrobalan. Lastly, Thin-Layer Chromatography (TLC) is a physicochemical technique to separate the test solution (a mixture of chemical compounds) into fractions due to variable solubility, which can then be visualised as coloured bands or zones on the TLC plate and compared to standard markers and/or a reference solution. One or several characteristic zones with a certain colour and intensity need to be present in the analysed sample under UV and daylight conditions. Even though these can be compared with markers on the plate and with previous TLC results, there is always some room for variation and subjectivity of interpretation, as will be discussed more in Chapter 4 on quality. When all necessary tests are performed and the protocols are filled with handwritten results and TLC photographs, the outcomes will be entered into the computer system. The documents and digital results will then be checked again by Erich. A certificate of analysis is furnished, and if the results turn out to be within specification, the analysed batch of raw materials may be released for use in production.

On the production site, the identity and status (released or not and until what date, also indicated by a separate green label) of each raw material can again be read from a label with barcode on each container. Nonetheless, before the raw materials are weighed and then mixed mechanically, one production employee will inspect the colour and smell of the powder in each bag used – not only of a representative sample as in the lab – by comparing it to a set of reference samples. In the past this employee also tasted each batch of drugs, but this check was abandoned in light of health and safety reasons. It was also questioned

whether one can still accurately compare the taste after trying several ingredients consecutively.

### 1.5 Commensuration, translation and identity politics

Many names are written in Tibetan medical, *materia medica* and pharmacy texts, which are products of their time and place as well as the individual (and possibly conflicting) views of their authors and the medical lineages and schools to which they belong. These names are not always accompanied by descriptions, based on which it is moreover often nearly impossible to precisely identify what entity (or entities) the names refer to. A cornucopia of synonyms (some derived from other languages such as Sanskrit or Chinese) is provided as well as a significant body of literature on substitutions. As Sowa Rigpa spans from Tibet and China to Mongolia and Russia and across the Himalayas (Bhutan, Nepal and India) and to Europe and beyond more recently, the distinction between synonyms and substitutes blurs as plants with identical names (or their derivatives in other languages) and their synonyms come to refer to other locally-available substances. Although a lot of repetition and cross-referencing (often unacknowledged) is to be found, each text may be considered as a written, codified instance of situated and partial knowledge which is again interpreted and resituated by individual scholars both ancient and modern. Tibetan medicine itself was forged from and has been interacting with (medical) knowledge systems as well as local knowledge-practices since its inception. Tibetan scholar-physicians are indeed aware of this rich diversity, even if they often strongly identify with certain interpretations, which they consider authentic and superior.

However, since early modern times – at least from the early eighteenth century onwards (see Surkova et al. 2012 in Chapter 6), before the publication of *Species Plantarum* by Linnaeus in 1753 which was only recognised as the starting point of binomial botanical nomenclature in 1905 – the clash of Sowa Rigpa identification, nomenclature, and classifications with Western botany has been added on top of its already staggering complexity and multiplicity. Already in the earliest study focusing exclusively on Tibetan medicine in a European language (Aschoff 1996), Joseph Rehmann's *Beschreibung einer*

*Thibetanischen Handapotheke* (published in St. Petersburg, 1811), Latin scientific names were correlated to names of Tibetan medicinals. Rehmann met a Mongolian lama-physician on his travels near the Siberian-Chinese border, from which he bought a collection of about sixty raw materials. He recorded the pronunciation of the drug names by Lamas in German approximations, and had the plant materials identified by a botanist. *Arura* was listed first under the gloss 'Azura' (Rehmann 1811, p. 56) as 'the nut of an unknown tree', although it was linked by a consulted pharmacist to 'Myroballani'. It then took almost a century before this pioneering journal article was superseded by more systematic early Russian translations of the first two volumes of the *Four Tantras* (Pozdneyev 1908), also based on the collection and identification of botanical samples) and full-fledged dictionaries spanning the Tibetan, Latin (scientific) and Russian languages (Gammerman and Semichov 1963). During this period Hübötter (1957) also published on 'Chinese-Tibetan' pharmacology in Germany, while it was only in 1973 that the first modern (and also illustrated) *materia medica* work with Tibetan-Chinese-Latin coverage was published in the People's Republic (see Hofer 2014a). This history of translation is clearly not exhaustive, but it does provide interesting leads to follow up in a similar vein to recent nuanced diachronic analyses of Chinese *materia medica* in particular (Hsu 2010; Kubo 2009; Nappi 2010, 2013; Winterbottom 2015), exposing the legacy of colonialism and the concomitant encroachment of Eurocentric scientific worldviews and practices on 'Others'.

The pioneering longitudinal studies on Chinese *materia medica*, by Kubo on *mu dan* (2009) and by Hsu (2010) on *qing hao*, have demonstrated that both the names as well as the substances they allude to are subject to considerable and unexpected change over time. Hsu (2009, 2010) has also made explicit that herbal medicines should be considered as cultural artefacts first of all because of their highly sophisticated and culture-specific processing and preparation, while blurring the boundaries between 'traditional' and 'modern' drugs due to the not infrequent integration with biomedical rationales and chemicals. Recently however, historian Carli Nappi has taken this kind of object histories a critical step forward. In her work on caterpillar fungus (2010) and ginseng (2013) inspired by Bruno Latour's hybrid actor-networks, she argues that a single trans-historical object

does not exist – there is no stable, coherent entity across time – since facts cannot escape their network of production. What is left to be accounted for is a ‘history of likeness’ or genealogy throughout a web of textual technologies and related practices of identification, synonymy and objectification. Arguing for plural histories in the context of the ongoing construction of Chinese national pharmacological coherence in reaction to ‘Western’ biomedicine, she rightly observes:

One need only to think of the contemporary practice of assigning Latin binomial nomenclature to classical Chinese plant and animal names as a common example of a seemingly innocuous practice that nonetheless is effectively a kind of textual and nominal imperialism: drugs are re-made and tamed into conveniently classifiable elements of a Linnean taxonomy, much as an increasing number of Chinese herbal medicines are epistemically transformed into bio-medical entities by being tested for active molecular compounds. (Nappi 2010, p. 22)

In early modern China ‘ginseng’ (*ren shen*) as we more or less know it now was created through a shift in identification practices away from analogy through resemblance (with the human body, or other plant drugs), towards the observation of novel criteria such as features on its surface to assess quality. In parallel, practices of translation steered by the Qing court coalesced an assemblage of names, descriptions and representations into a (much more) singular stable object (Nappi 2013). Following Nappi’s approach, Winterbottom (2015) traces the early modern circulation of a famed anti-syphilis drug named China root, nowadays usually identified with *Smilax* spp., elucidating how colonial market forces redefine its ‘discovery’ in a shift from orientalist exoticism to xenophobia, even re-branding what first was a substitute as the authentic drug to avert a European wealth drain.

I would like to call this *commensuration*, the process whereby the situated identification and naming practices of disparate currents of tradition – in this case contemporary Sowa Rigpa and botany – are forced to correspond, validating one-on-one translations of object-names between traditions. This is an imposed equivalence based on premises of universalist common sense (as discussed in Hsu 2010a), functioning only after decontextualisation from people (culture), text (time), and locality (space) has taken place

(see Ellen and Harris 2000 for a critical review). It is therefore a neo-colonialist and unidirectional effort where the historical fluidity (*à la* Nappi) together with the practical multiplicity and flexibility of Tibetan *materia medica* (cf. Blaikie 2015) is annihilated through solidification and simplification, while the botanical science categories remain unaltered but expand their reach. The argument presented here can also be interpreted as a rephrasing of Vincanne Adams' (2002) *tour de force* on 'randomised controlled crime' in Tibetan-biomedical encounters, but in this case botanical classification becomes the gold standard, determining the rules of the game: plant categories are universal (one and the same cross-cultural knowledge currency), proper botanical identification is incontrovertible, and plants are reducible to lists of independently observable characteristics. Regrettably, even though commensuration comes at a considerable cost, creating problems that do not exist if one treats the respective taxonomies separately and disempowering Tibetan medicine and its practitioners, many scholars and scientists as well as practitioners of Asian medicines continue to subscribe to these practices.

Why, what is the benefit, and for whom? Big (or Small) Pharma cannot be the scapegoat again and take all the blame.<sup>27</sup> The modern botanical 'etic' grid, building on Linnaeus, serves as the foundational paradigm of ethnobiology (see Ellen 2006), and is deemed to be a pragmatic necessity for effective communication, to be able to translate and apprehend the ethnographic Other. We are all caught up in the globalisation and commoditisation of indigenous knowledge through conservation-development discourses and concomitant efforts in the documentation and preservation of knowledge ostensibly on the verge of being lost, but I follow Pordié (2008b) and Alexiades (2009) in calling for more attention to the implications of identity politics in relation to competing claims of legitimacy. Notwithstanding its nefarious effects, botanical identification equally has the capacity to valorise *amchi* knowledge, to aid in the co-management of medicinal plants, and to strengthen local ownership over these resources. However, the parties involved have to

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<sup>27</sup> Ironically, in the already highly standardised Swiss/European context of PADMA the translation of Tibetan medicinal plants into fixed botanical species and their introduction as multi-compounds onto national markets could even be interpreted as an enrichment of the nowadays limited spectrum of allowed and recognised herbal medicines. In these countries the commensurated species are often considered 'novel', whereas from a constructed global Tibetan medical perspective these species are but one of many plausible options.

critically assess the partiality in these acts of commensuration and make explicit this uneven negotiation and the transformations that ensue, as has been exemplified by Aumeeruddy-Thomas and Lama (2008). Many are aware of the plasticity of Sowa Rigpa *materia medica* as it is essential in enabling contemporary situated practice, but most publications nonetheless subscribe to the rigidity of facile commensurations in a schizophrenic manner. This slippage may in turn feed back to society, in effect universalising partial, distorted truths. Even though I am very sympathetic to interdisciplinary conversations and collaborations beyond cultural and linguistic comfort zones (Craig and Glover 2009), we have to keep asking ourselves what is lost in translation, and why this matters. There lies a danger in covering up the local, regional and historical variability that extends far beyond written Sowa Rigpa pharmacopoeias by universalising their translations. Definite botanical identification of Tibetan *materia medica* can only make – some, partial – sense within a clearly specified, limited textual and spatiotemporal (and *in extremis* individual) context. Returning to politics, this is not to say that the juxtaposition of Linnean and Tibetan names is not mobilised extensively in nationalist projects of modernisation, standardisation, institutionalisation, and industrialisation (Kloos 2010, 2013; Saxer 2013), rejecting the authenticity of smaller branches of Sowa Rigpa. This chapter invites researchers to reflect critically on their positionality within these processes, and for this the politics of identification and naming practices provides an important starting point (Hsu 2013).

## 2 Sourcery: corruption and the failed formalisation of Indian medicinal plant trade

I first visited the spice market of Old Delhi in October 2013. I was staying in a guesthouse in Majnu-Ka-Tilla, the Tibetan Colony that was established in the outskirts of New Delhi around 1960 in the wake of the first wave of refugees fleeing Chinese oppression. This small, shanty enclave on the bank of the heavily polluted Yamuna river is also where *amchi* Penpa would stay if he needed to come down to Delhi to find machine parts or to purchase herbs for Men-Tsee-Khang's Pharmacy. Ugyen Tsewang, the Bhutanese manager of Men-Tsee-Khang Exports I talked to the day before in Kalkaji (Audio recording 31), had advised me to go to Khari Baoli early. It was autumn and Diwali was coming up, the Hindu festival of light. Lots of people would go to the market to buy groceries and presents so the roads would be even more congested than usual. Ugyen knows the spice market well. He goes there when he receives an order from the Herbal Product Research Department (HPRD): to buy oils – but not the crude herbs, which is Penpa's terrain – to be used in the Sorig product range.<sup>28</sup>

After taking a cycle rickshaw, the metro to Chandni Chowk and another short rickshaw ride, I was dropped off at a busy intersection and pointed in the right direction. As is normal for any first-time visitor, I felt lost and was overwhelmed by Khari Baoli's hustle and bustle. The main road is a long, broad lane lined by rows of shops, while the street itself is cluttered on both sides with more retailers, traders, stacks of jute bags and crates, and porters with

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<sup>28</sup> Men-Tsee-Khang Exports, located in the Kalkaji district of South Delhi, sells and sends herbal beauty products, teas, dietary supplements, incense and other items produced by Men-Tsee-Khang and showcased on their website ([www.men-tsee-khang-exports.org](http://www.men-tsee-khang-exports.org)) overseas to international distributors, retailers, and customers. See Gerke (2012) for the relationship of these commodities with Tibetan medicine and concepts of rejuvenation.



their long wooden carts (Figure 2.1). It is not just spices that are sold here, coconut and copal were being traded intensively along with an extensive range of dried fruits and nuts (cashew, almonds, walnuts, dates, raisins, pistachio, and so on) mainly for retail. What follows are some of my first clumsy interactions with sellers, as they give a good sense of what the trade is like for the uninitiated (28 October 2013, Diary).



Figure 2.1. The main street of Old Delhi's spice market, Khari Baoli. Photographed by the author on 28 October 2013.

I asked around where I could find herbal medicine suppliers. An older bystander guided me to a shop across the street. The three men (almost no female shopkeepers to be found here) in this small room only spoke a few words of English. One was more fluent, but he kept silent at first. I mentioned *harad*, which I thought corresponded to *Terminalia chebula* and to the famed *arura* used in so many Tibetan formulations. They had four types, from expensive to least expensive: *harad* 'Kabul', *harad* 'Bombay', *harad* 'Katni', and 'Indian' or 'local' *harad* (Figure 2.2). The seller offered me some chai, and my 'helper' left. The men in

the shop were laughing, especially because I thanked him for introducing me. The prices I got at first however, were commission prices, because that man wanted his share. Serious again, they gave me the 'cut' prices: 500, 200, 100, and 60 rupees (7.4, 3, 1.5, and 0.9 USD), which was still very high I found out later. Together, they explained that the price of herbs depends on whether it is in or out of season, but for *harad* there are no seasonal prices. The yearly price can fluctuate a little according to how successful the harvest was, in relation to the weather. Of course, depending on how much you buy, the price also changes (up to twenty rupees or 0.3 USD per kg). When I wondered out loud how long the herbs could be kept, the seller replied 'more than five years without a problem in cold storage'. But this was contrary to the storage methods I observed during my fieldwork, and indeed within the same and other shops that day. The shop owner gave me his card: 'call me if you want to do business'. We shook hands and said goodbye. By now the streets were bursting with cycle rickshaws, scooters, men carrying large sacks or transporting goods on carts, and shopping pedestrians. Getting out of Old Delhi was virtually impossible, as traffic came to a complete standstill.



Figure 2.2. Some types of *harad* found on Delhi's Khari Baoli market: *harad* 'Bombay' (top left), *harad* 'katni' (top middle), *harad* 'chilka' (pitted, top right), 'local' or 'Indian' *harad* (bottom left) and 'Kabuli' *harad* (the largest fruits, bottom right).

I experienced first hand how unreasonable it is to enter this market armed only with a list of plant names and then hope you will be able to find the right thing or even find out about prices. A buyer needs to be aware of the current names, prices, and what exactly s/he wants in advance in order not to get the wrong item (perhaps an inferior substitute or a counterfeit) at an incredibly inflated rate. There will likely be several types of the same raw material, with each type subdivided further into quality grades. The quality, timing (year, season) and volume will all influence the price. There is not one standard name, no standard price, nor quality. This further implies trade surveys are only meaningful on a generalised level, which puts the recent spate of 'market ethnobotany' in a different light as these do often assume these are a straightforward context for research (see section 2.2). All these aspects have to be bargained and agreed with the seller based on samples and also carefully checked when the order comes through. In this process, knowledge of the

market and negotiation skills are of paramount importance. Since domestic transactions are largely undocumented, only the security of a long-term business relationship can ensure that both parties follow suit. Nevertheless, Khari Baoli is infamous for its short-term bargains and fast retail market on the one hand, and its huge turnover in volume on the other. Small and medium-sized pharmacies and factories in a radius of at least a hundred miles would all buy from Delhi as I was told by a long-time trader (Audio recording 70), while the huge companies mainly rely on their own networks of collectors and farmers. Both Men-Tsee-Khang and PADMA are neither fish nor fowl, roughly producing between forty and seventy tons of medicines a year which consist of a large number of ingredients in low volumes, preventing the benefits of economies of scale. The former has a handful of big suppliers (two or three in Delhi, four in Amritsar), while the latter shies away from the bazaar market as a whole in the search off smaller suppliers and individual contacts from whom they can get specific information on provenance. This is nearly impossible to get from wholesalers, who either don't know exactly (a lot is purchased via commission agents, or at times from other wholesalers), or don't want you to know where they sourced their materials to prevent being sidestepped.

The written, formal, statutory component of governance stands in stark contrast to the so-called informal (though often very formalised) institutions and systems operating in many communities. Rooted in customary law and commonly coexisting together with statutory governance in the form of legal pluralism, these institutions are of paramount importance for effective regulation (Laird et al. 2010, Ostrom 1990). Governance is an oft-studied but hotly debated dimension of conservation-development, as is evidenced by the burgeoning literature on commodity chains (Gereffi et al. 2005; Gereffi and Lee 2016; Gibbon et al. 2008) and NTFPs (Laird et al. 2010). The far-reaching impacts of (inter)national regulations on Tibetan medicine have also been highlighted in the anthropological literature (Craig 2011; Craig and Adams 2008; Janes 1995; Saxer 2009, 2012), and the complexities surrounding Tibetan medicinal plant cultivation, trade and conservation are also increasingly being recognised (Aumeeruddy-Thomas and Lama 2008, Blaikie 2009, Craig and Glover 2009, Saxer 2009). Building on this literature, I respond to a series of calls for a more integrated approach to plant-based commodities that takes into account socio-

political, economic and ecological aspects (Alexiades and Shanley 2005a, Neumann and Hirsch 2000, Shackleton et al. 2011, Shackleton et al. 2015, Wollenberg and Ingles 1998), tempering initial euphoria around their usefulness for biodiversity conservation and poverty alleviation (cf. Belcher and Schreckenberg 2007, Shackleton and Pandey 2014).

Three anthropologists have thus far provided fine-grained ethnographic insights into the harvest and trade of Tibetan *materia medica*: Sienna Craig (2012), Martin Saxer (2009, 2013), and Calum Blaikie (2009, 2014). In the chapter of her monograph titled *Cultivating the Wilds*, Craig (2012) explores intersections between political ecology and medical anthropology as Sowa Rigpa practitioners interact and at times clash with conservation-development organisations, and the concomitant commodification of Himalayan natures and cultures. *Amchi* offer local critiques of conservation in pointing out the complicity of the government and big-business Tibetan medical factories in stimulating mass for-profit collection by locals, while they feel that governments seem to care more about the plants than the practitioners who rely on them for healing. Blaikie (2009) expands on these themes based on his long-term fieldwork in Ladakh. He contends that rural *amchi* and small-scale medicine production have in fact become ‘critically endangered’ due to a push towards medicinal plant conservation through cultivation. This shift reconfigures local practices in unpredictable ways, but generally feeds in to increasing industrialisation, modernisation and professionalisation. In his doctoral dissertation (2014), Blaikie unsettles the oft-assumed teleological progression towards commercialisation for Ladakhi Sowa Rigpa by bringing the intricacies of *amchi* economics and *materia medica* network dynamics to the fore. Wild-collection by practitioners, gift-giving, sharing, lending, direct exchange and buying and selling of raw materials all contribute to the maintenance of *del*, a network of personal relationships through which materials and knowledge flow. The markets of Delhi and Amritsar I explore below also provide the major contribution to Ladakhi *amchi* supplies. But even though money has become the dominant medium of exchange, social dynamics between parties remain complex and unexplained solely by the principles of a market economy. Saxer (2009) highlights the fact that Sowa Rigpa has never been an exclusively local tradition, necessitating trans-Himalayan trade for some of its most prized medicinal raw materials since its conception. While cross-border trade is certainly not a

new phenomenon, the recent industrialisation of Sowa Rigpa in Tibet has engendered three new border regimes that govern the transit of herbs and traders to Nepal: (1) concerns over quality in relation to the massive surge in demand (licensing, the need for import permits, a limited number of authorised entry ports), (2) the stricter enforcement of CITES on the Nepalese side as a response to fears of resource depletion, and (3) constraints on the free movement of Tibetans due to the fragile political situation. Such regulations can nevertheless come with unintended side-effects, which eventually undermine their intended goals:

[w]hereas the border regimes are designed to manage the transit of traders and goods, their justification derives not only from their capacity for control but also, even more importantly, from facilitating successful trade. In this sense the survival of a border regime rests, ironically, on both officials and traders breaking its rules in order to make it work. (Saxer 2009, p. 337)

The argument I will present here aligns strongly with Blaikie's and Saxer's work, while adding a hitherto missing critical analysis of the governance of Indian medicinal plant trade. My fieldwork however has led me far away from the specifics of Tibet and Tibetan trade (Cuomu 2013). Tracing Tibetan *materia medica* through Indian supply chains, one can easily lose touch with Sowa Rigpa altogether as it dissolves into the much larger Ayurveda-dominated trade.<sup>29</sup> In contrast to the rest of my dissertation, this chapter is not based mainly on fieldwork undertaken at Men-Tsee-Khang in Dharamsala or at PADMA in Zürich. Although I was able to get insight into the sourcing strategies and tactics employed by staff involved in the purchasing of raw materials at these institutions by focusing on the four plant subjects of this thesis, my aim in the field was to trace these herbs back from the manufacturers all the way to their places of origin. To their roots. This turned out to be a daunting task. Both producers put me in touch with two of their principal suppliers in India, who I subsequently visited in Delhi (October 2013, March 2014, and August 2015), Gurgaon (March 2014, August 2015), Amritsar (July 2015), and Manali (July-August 2015). Because and sometimes in spite of this personal introduction from one of their important customers,

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<sup>29</sup> A minority of Tibetan medicinal plants falls outside the remit of the mainstream Indian Ayurveda-dominated herbal industry, which means that producers have to rely on different sourcing strategies. This was for instance the case for *Meconopsis* spp. (*tserngön*, *utpel*, etc.), which are sourced by Men-Tsee-Khang from Tibet via Nepal or wild-harvested by staff and students in Himachal Pradesh.

these four traders were surprisingly supportive of my research and open to enquiries. I also explored the large wholesale markets of Delhi and Amritsar independently, buying herb samples (being hopeless at bargaining) and questioning a number of sellers on trade names, quality grades, (incredibly inflated) prices, and (vague descriptions of) sourcing. A researcher identified as a tourist and treated as a wealthy, ignorant client stands little chance of gaining any reliable, in-depth information. Luckily I had my connections and was also able to join an Ayurvedic practitioner and friend on a shopping tour of his most trusted sources in Amritsar's medicinal market maze for more intimate encounters. The jump from suppliers and large wholesale markets to harvesting areas is a quantum leap that can only occur within a configuration of trust between harvesters, traders, manufacturers and the traveller himself. Despite my best efforts, I succeeded in physically following the trail of only one of my four study plants back to where it grows and is harvested: *ruta* (here equated with *Saussurea costus* or 'costus'), one of the few high-altitude Tibetan medicinal plants to be cultivated successfully in fields (Blaikie 2009). Cultivation obviously makes the plants easier to locate, but it still took us nearly two days of driving from Manali to reach the farms deep in Lahaul Valley. The trader who drove us there was also a cultivator, and incidentally he was selling to both PADMA and Men-Tsee-Khang. The larger lesson here is the fact that this kind of data, as important and central as it is for many analytical models of NTFP commodity chains, is extremely hard to obtain in a reliable manner.

Following these tracks, I came across alleged instances of 'illegal trade', 'bribery' and 'corruption'. My theoretical goal then became to examine how and why these notions are mobilised in the Indian medicinal plant trade. This proved to be fertile grounds for critiquing the moral high ground taken in the dominant conservation-development discourse and by the Indian state, which is based on a reified division between formal and informal economy and the concomitant assumption that strictly regulated, legal markets are always more beneficial for people and plants. In an increasingly formalised but highly dysfunctional state governance regime however, what many label as informal, illicit or corrupt may be the only viable option to stay in business. To drive this point home, I draw on 'sorcery' as an analytical descriptor for the sourcing of medicinal raw materials from Indian soil to the factory. Sorcery and magic play a central albeit ambivalent role – not

unlike corruption – in anthropological debate, which I will start to unpack in the next section. The following characteristics associated with these practices turned out to be useful descriptors for the trade: opacity (of the full nature of the supply chain), the role of initiation and participation (a prerequisite for grasping how the market truly works), communion with higher authorities (i.e. government officials), and the moral, economic and ecological perils these practices may engender (charges of illegality, loss of business, and the risk of natural calamities due to the over-exploitation of resources). This ‘magical’ reality seems far removed from the disenchanting, formal vision promulgated by (non-) governmental institutions. The juxtaposition of the rigid frameworks of formal governance, designed by policymakers and supported by a number of scholars and scientists, with the labyrinthine realities of trade on the ground leads to inevitable gaps, mismatches and confusions.

In the next section, I first briefly situate the main analytical tools utilised in this chapter within the anthropological literature. This is followed by an excursion into the history of the NTFP concept and its application in Himalayan and Indian medicinal plant surveys, in which I critically appraise the formal, disenchanting perspective on the trade. This sets the stage for sections 2.3 and 2.4, which are fieldwork-based, and seek to illustrate the observed incongruity between the idealised governance of the Indian herbal industry and actual trading practices. This chapter documents the becomings of (Tibetan) medicinal plants after their identities are gleaned from textual sources in dialogue with situated knowing practices (Chapter 1), and before they are transformed into ingredients of medicines (Chapter 3). The reformulation occurring on the market is the transition from living organism to commodity. But this shift cannot fully eradicate ‘the unruliness of the wild’ (Saxer 2013, p. 95). This is where the flexibility of informal economies plays its role. Therefore, I argue that policies aiming to formalise Indian medicinal plant trade fail to account for these unfathomable uncertainties and complexities. ‘Sourcery’, the idea of a risky and dark practice of sourcing raw materials, is the manifestation of a failed formalisation, the *alter ego* of the state-sanctioned herbal sector.



## 2.1 Sorcery and corruption as occult (counter-)politics

Bubandt (2006) contends that magic is an extension of politics on another level<sup>30</sup>, as he witnessed how both sorcery and corruption are part of the same occult politics of the on-going democratisation of Indonesia. Both are politically efficacious yet morally ambivalent, often go together, and share the common dilemma of the unknowability of the other:

Sorcery and corruption are quintessentially activities of the other. Yet their prevalence amongst other people forces each individual, and each individual politician in particular, to seek magical counter-measures and to establish his or her own networks of 'mutual help' (Bubandt 2006, p. 426).

The strong link between these practices and democracy in this case disrupts *a priori* divisions between 'good' and 'bad' politics (an assumption that prevents in-depth ethnography), as processes of decentralisation and increased transparency equally brought about new occult dangers while showcasing the interplay between formal and informal power discourses. In this light it seems the world was never fully disenchanted, demystified, secularised and rationalised, strong modernist forces notwithstanding (Jenkins 2000).

To get to know the occult nature of the Indian medicinal plant sector the only option is to take part in it, or like a true anthropologist, at least pretend to be part of it by observing insiders from close by. This penchant for participation<sup>31</sup> as a prerequisite for proper insight equally surfaces as a key characteristic in magic and witchcraft. Strikingly similar to analyses of corruption, anthropological research on these tantalising topics evidences its circularity (witchcraft can best be dealt with by witchcraft), ambivalent figures and their moral ambiguity (precarious distinctions between positive and negative forms), a troubled relationship with nation-states and capitalist economy, and paradoxical interactions with modernity (Geschiere 2001). Without delving deeper into these bodies of literature<sup>32</sup>, I use

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<sup>30</sup> See Rowlands and Warnier (1988, p. 121) for an early, very similar statement in the context of the modernising state of Cameroon.

<sup>31</sup> In a secularised and disenchanted modern world (*vide* Max Weber), participation – vaguely defined as a mystical union of person/subject and thing/object – is supposedly suppressed by an ideology of (scientific) instrumental causality (Hanegraaff 2003).

<sup>32</sup> In India, women are common targets of witchcraft accusations and witch hunts in tribal communities (Chaudhuri 2012, Mullick 2000). These have been interpreted as the result of profound socio-economic changes and gender inequalities and struggles that manifest as these indigenous societies integrate more

these generalised traits of sorcery and witchcraft as analytical tools to paint an alternative and often misunderstood picture of how the Indian trade in medicinals operates.

In liberal policy circles, corruption is one of the most salient ‘global problems’, which despite all efforts seems to continue more or less unabated. Opinions also vary widely across the social sciences on its definition, causes, countermeasures, impacts and management. Problematically, political corruption is mostly conceived at the level of the nation-state and as a public sector issue – ignoring local embeddedness, sectorial specificity and trans-border operations – though economic liberalisation (as well as commercial bribery) has blurred the public-private distinction even in its most superficial reading (Heywood 2015). In this light and through an anthropological lens (see Torsello 2011 for a review), seemingly universal and acultural definitions such as ‘the abuse of public office for private gain’ have to be problematised (as indicated by Haller and Shore 2005, p. 5, referring to the World Bank). A modernist preoccupation with transparency and liberalisation and ‘good governance’ policies has framed corruption as caused by ‘rotten apples’ in the public sector, and not as an institutional or systemic problem (conspiracy theories notwithstanding). When applied to ‘developing countries’, however, this explanation is precariously reminiscent of colonial discourses that project unenlightened characteristics onto ‘backward’ societies. There is indeed a symmetry between the apparent chaos of sourcing plant materials in India, and that of the paper-mountains of herbal medicine legalisation efforts in Europe and the ensuing structural violence, elucidated in Chapter 6. Alluding to sorcery in the former case, and not the later, runs the risk of consolidating the traditional/modern dichotomy I try to overcome.

My aim is thus certainly not to judge what ‘corruption’ is and what it is not; it is exactly the slippage of the legal, societal and moral judgement that ensures its widespread and varied

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into the Hindu-dominated patriarchy (Mullick 2000), whereas police and other state actors attempt to stamp out these activities, which they regard as ‘backward’ (Desai 2009). Gender discrepancies also play into the Indian herbal industry: a large portion of the collectors are female (who are blamed for indiscriminate wild-harvesting, which is low-prestige and arduous work), while middlemen and wholesalers seem to be exclusively male (who are blamed for exploiting the harvesters; cf. Olsen and Larsen 2003, Larsen and Olsen 2007).

currency. Instead, I approach allegations of ‘corruption’ as discursive devices that legitimise practices on the borderlands of in/formality and il/legality in the dealings of medicinal plant traders in India. I illustrate the irreconcilability of many day-to-day practices with government and NGO policies, arguing that the push towards formalisation of the trade has largely failed. Instead, the business I conceptualise as ‘sourcery’ takes place in a convoluted legislative greyzone and through ambivalent economies of favours. Even though I borrow terms that are frequently associated with sorcery, witchcraft and magic I am cautious not to assume that ‘informal’, ‘illegal’ and ‘corrupt’ activities are necessarily hidden or occult. This would in itself represent an ethnocentric, puritan and rationalist bias and risks romanticising these practices in an act of political voyeurism. As noted by Ledeneva (2014) for late and post-communist Russia, these networks of mutual help are a tacitly accepted ‘open secret’. Economies of favours outwit the constraints of centralised distribution systems while also evidencing that it is infeasible for the state to fully enforce its own far-reaching regulations. They thus simultaneously support and undermine the workings of establishment, triggering the ‘modernisation trap of informality’ (Ledeneva 2014, p. 16): ‘one cannot use the potential of informal networks without triggering their negative long-term consequences for institutional development’. Due to its ambivalence, the boundaries between corruption and informality fade. Following Ledeneva, I ask if informal practices corrupt a corrupted regime – in my case India’s NTFP policy implementation – can it still be referred to as corruption?

I did not set out to study this phenomenon, but was struck by the prevalence of accusations of corruption towards state officials and bureaucrats – a notorious feature of contemporary Indian society – and of accusations of informality/illegality towards medicinal plant harvesters, growers and traders within Indian medicinal plant trade surveys and policy documents. In India, corruption has received ample consideration by anthropologists, particularly since the ground-breaking work by Akhil Gupta (1995, 2005, 2012).<sup>33</sup> His

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<sup>33</sup> In recent anthropological journal articles corruption in India has been interpreted as an ‘ordinary space of negotiation’ (between low-level state functionaries and street hawkers in Mumbai, Anjaria 2011), as a ‘means to lower-caste empowerment’ (in Bihar, Witsoe 2011), as legitimising ‘provisional agency’ (with police in Uttar Pradesh, Jauregui 2014) and as discursive re-constitution of the urban middle class and the state in rational and corporate-consumer terms (Khandekar and Reddy 2015).

analyses of popular narratives and media and fictional discourses of corruption in North Indian villages and beyond unravelled their contributions to reified, fetishised representations of 'the state' and 'civil society' as stable, unitary entities, serving as an imperialist Western conceptual apparatus. Popular knowledge of the state is inextricably linked to notions of corruption as poor and illiterate villagers aim to cope with the structural violence inherent in bureaucratic encounters that is further exacerbated by corruption:

The discourse of corruption turns out to be a key arena through which the state, citizens, and other organizations and aggregations come to be imagined. Instead of treating corruption as a dysfunctional aspect of state organizations, I see it as a mechanism through which the state itself is discursively constituted. Corruption is an essential lens for understanding the meaning of the state in the Indian context. (Gupta 2012, p. 78)

The argument I will elaborate in this chapter equally shows the shaping effect of corruption discourses in the composition of the state, in this case not by 'poor villagers' or regional media, but by (peri-)urban middle class herb wholesalers, traders and exporters. In addition, I look at how the state itself in the guise of policy makers and their documents mobilises a different (counter-)corruption discourse that accuses harvesters, cultivators and traders of illegal, unethical and corrupt practices in its struggle to come to terms with the messiness of a reified herbal 'sector'. Moving further away from Gupta's work and in line with the more recent and urban fieldwork in the East Indian industrial belt city of Jamshedpur (Sanchez 2012, 2015), I question informal/formal boundaries in the Indian economy in the wake of liberalisation. Sanchez collapses the distinctions between corruption and organised crime – defined as 'a cooperative practice that brings together capitalists, corrupt institutional actors and violent entrepreneurs in mutually beneficial relationships and is based upon the exchange of distinct skills and areas of authority' (Sanchez 2015, p. 68) – as criminal entrepreneurs act as valves between licit and illicit economies. In so doing, the attention is shifted from public discourses on petty bribery (cf. Gupta, where villagers 'imagine' a core of state accountability at higher levels) to violent and systematic forms of criminal entrepreneurship that are integral to India's political economy and national politics.

## 2.2 Attempts at governing the wilds

### 2.2.1 The global boom-bust cycles of the NTFP concept

During most of the last century ‘forest products’ was a term restricted essentially to industrially-processed timber and wood fibre, to the detriment of often equally or more valuable wild products, the majority of which descended into invisibility in natural resource policy and management across the globe (Laird et al. 2010). From the late 1980s onwards, however, the non-timber financial, socioeconomic and cultural values of forests were increasingly recognised due to a dramatic shift away from protectionist approaches – epitomised by the creation of exclusive protected areas and restrictive treaties such as CITES in the 1970s, the Convention on International Trade in Endangered Species of Wild Fauna and Flora – and towards the integration of sustainable use and social justice into the international conservation agenda. Propelled by the Brundtland Report that argued for sustainable development (World Commission on Environment and Development 1987), the Convention on Biological Diversity (CBD), and voices for indigenous peoples’ rights (Posey 1996), NTFPs and their commercialisation emerged in the nineties as ‘ecologically benign and socially just income-generating activities’ (Laird et al. 2010, p. 3) that married the goals of conservation and development, relying on slogans such as ‘use it or lose it’ (e.g. Akerele et al. 1991). The underlying assumption was that forests, and trees in particular, will be left intact despite and because of sustained NTFP collection (Neumann and Hirsch 2000).

Although widely criticised for being vague, politically naïve and contradictory (see for example Escobar 1995), these conceptions are still pertinent to policy agendas of international NGOs and institutions such as the World Bank. Signed at the Rio Earth Summit of 1992 and legally binding for national government parties, the CBD further foregrounded access and benefit sharing as well as connections between the sustainable use of biodiversity and traditional knowledge although wild product governance was neglected. But as the gains of many NTFP commercialisation projects proved to be elusive, scientists, resource managers and policy makers were urged to face the real complexity of forest livelihoods (Alexiades and Shanley 2005b, Neumann and Hirsch 2000). Shackleton et al. (2011, p. 263) conclude that ‘the initial euphoria around using NTFPs for poverty

elimination and biodiversity conservation has been tempered'. Laird et al. (2010) add that international market-based conservation is often inappropriate and high risk (cf. Belcher and Schreckenberg 2007); local trade and subsistence use of NTFPs more often provide consistent opportunities for local communities. Moreover, commercial agriculture, logging and mining are frequently much more damaging to NTFP populations and forest than overharvesting. However, based on an extensive review of the NTFP literature, Pierce (2010) shows that NTFP commercialisation as a conservation-development tool is currently still the number one topic of interest. The number of NTFP studies has grown steadily during the last two decades, with the majority being published during the last few years (Shackleton et al. 2015). Developing countries and rural areas are the most prevalent study sites, whereas Asia and India in particular have the most papers (Shackleton et al. 2011).

Despite growing awareness of the significant contribution of these allegedly 'minor' products to rural livelihoods and household income, most governmental agencies continue to considerably restrict the harvest of NTFPs because of the following reasons (Shackleton et al. 2015): (1) a colonial legacy from the previous century of prohibition, restriction and control; (2) global concerns of biodiversity loss seeming to justify stringent regulation, which often brings in revenue for authorities; and (3) a dearth of guidelines that promote ecologically sustainable harvesting, relating to the challenges of understanding, monitoring and managing a multitude of diverse species. As a consequence, many agencies have adopted a precautionary (Cooney 2004) instead of an adaptive governance approach, based on the stereotypical view of harvesting as a destructive activity with inevitable damaging effects for the individuals, species and ecosystems involved. Recently, NTFP experts have argued for the need to curb this dominant, pessimistic narrative by discussing case studies of ecologically sustainable harvesting approaches and of successful management (Shackleton et al. 2015), and by repositioning NTFPs on the development agenda (Shackleton and Pandey 2014). NTFPs have come full circle: oblivion and protectionism up to the 1980s, then euphoria over commercialisation into the 1990s, followed by disillusionment and critical appraisals of the complexities and difficulties involved at the outset of the new millennium, and now a careful reconsideration of their potential for ecological and socioeconomic sustainability. This process went hand in hand

with the late-twentieth century crisis of colonial, military top-down forestry – related to lacking capacity, political will and legitimacy, as well as widespread rent-seeking – and a global trend towards the decentralisation and devolution of forest management. Gradually, the FAO-backed stable equilibrium forestry model, with standardised sustained yields, is being replaced by ideas of dynamic, complex non-equilibrium human ecosystems and the management of common-pool resources as part of complex, responsive socio-ecological systems. Regrettably, as Laird et al. (2010) conclude, NTFP legal and policy frameworks are still largely unsuccessful. Common features leading to this failure are (1) broad policy prescriptions geared towards a single goal or category of products that are insensitive to differences between subsistence, local and commercial trade; (2) an overwhelming bureaucracy, especially inappropriate for small-scale harvesters and traders; (3) poorly coordinated regulations resulting in confusion about mandates and jurisdiction; and (4) underfunded, inconsistent policy implementation. The seemingly straightforward NTFP concept has itself gone through a series of boom-bust cycles reminiscent of the hype surrounding many natural products, while the effects of its (mis)application often leave much to be desired. This is also reflected in surveys of Himalayan and Indian medicinal plants, to which I now turn, to sketch both the trade itself and the discourses utilised in its description.

### 2.2.2 Surveys of Himalayan and Indian medicinal plant trade

The main human use of biodiversity by number of species is for medicinal purposes (Hamilton 2004, Schippman and Leaman 2006), amounting to more than 10,000 species in the Himalayas alone (Ghimire 2008).<sup>34</sup> There is a large and growing global demand for herbal medicines (Hamilton 2004); trade surveys indicate that the botanical medicine industry is booming not only in the West (Laird 1999, Lange 2006), but especially in China (Liu et al. 2009) and the Himalayan region (Thomas et al. 2005). In China, a series of recent, fast and far-reaching transformations – instigated by the institution of drug registrations

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<sup>34</sup> 'Medicinal plant' is not always a clear-cut category because many – if not most – plants have several overlapping uses. This is why the acronym MAPs (Medicinal and Aromatic Plants) is often applied to indicate the confluence with spices, health foods and natural cosmetics (as for instance by Schippmann et al. 2002). In the USA the even broader term 'botanicals' is in common usage (Laird 1999).

and the introduction of GMP – led to the creation of a new Sowa Rigpa industry on the Tibetan plateau in less than a decade (Saxer 2013). This rapid industrialisation and concomitant commercialisation led to a thirtyfold increase in output value between 1996 and 2006.<sup>35</sup> These findings clearly illustrate the growing importance of Himalayan medicinal plant trade, while it has been estimated that seventy to eighty percent of the Himalayan rural population continue to locally depend on medicinal plants for primary healthcare (Aumeeruddy-Thomas and Pei 2003). In the Himalayas, a high percentage of commercial NTFPs are medicinal plants – estimates ranging between 143 and 161 in Nepal alone – and an increasing trend towards large-scale commercial extraction is noticeable (Ghimire 2008). Malhotra and Bhattacharya (2010) estimate that 275 million underprivileged Indian rural people (more than a quarter of the total population) significantly depend on NTFPs for subsistence and cash income (see Tewari and Campbell 1995 for a similar approximation). This NTFP sector annually provides roughly ten million workdays and the export value of NTFP-based products accounts for 68% of total forestry exports (Anonymous 2011). Forest-dwelling tribal communities, perhaps the poorest subset of the ‘Scheduled Tribes’, are especially dependent on forests and the majority is concentrated in the central-eastern dry deciduous forest belt where commercially valuable products such as myrobalan fruits and tendu leaves (*Diospyros melanoxylon* Roxb.) are available. It appears that India is the central, main market: Indian wholesalers import MAPs from all states across the Himalayan range worth millions of US dollars annually, and there is a huge domestic demand as well as considerable (re-)export (Mulliken and Crofton 2008, Olsen and Larsen 2003).

How do these numbers relate to state interventions? In the Indian subcontinent, the harvest and trade of natural products has long been shaped and governed by smaller and larger kingdoms and empires, colonial powers, and recently the modern Republic. Indian systems of medicine as well as Sowa Rigpa are ancient traditions going back many centuries

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<sup>35</sup> In the Tibetan cultural areas in particular, Yunnan has seen a tenfold increase in harvested medicinal plant volumes over the last decade (Pei 2002). The two most valuable NTFPs in this area are the caterpillar fungus (*yartsa gūnbu*, *Ophiocordiceps chinensis*) and the matsutake mushroom (*Tricholoma matsutake*), both of which have been intensely commodified and studied in detail (Winkler 2008, 2009; He 2010, Menzies and Li 2010 respectively).



(Ga 2010), and long-distance trade in many *materia medica* along the silk and musk routes likely even predates their origins (Akasoy and Yoeli-Tlalim 2007, Touwaide and Appetiti 2013, van der Veen and Morales 2015). Customary laws and local institutions have presumably always played a major role in resource access and trade, and regional monarchies and princely states also had their say through a variety of legislation, administration and taxation systems. My interest in the statutory regulation of herbs and spices in the Indian subcontinent, however, begins with the institution of colonial governance under the rule of the British Crown in 1858. Succeeding the private rule of considerable parts of India by the English and later British East India Company (1600-1874), taking direct control of their overseas trade monopoly (initially mainly in spices, but dominated later by cotton textiles, tea and coffee) had been one of the main goals of the Crown since the Company's inception (Erikson 2014). The imperial period, the British Raj, ended in 1947 with interreligious violence and the partition into India and Pakistan. While the Republic was only established on 26 January 1950, the hallmarks of European-style modernity – including state sovereignty, population surveillance (first all-India census in 1872), citizen education (first Indian universities in 1857) and technological innovations (the first telegraph line between Calcutta and its harbour in 1851, railway construction from 1853, etc.) – had already been introduced since the second half of the nineteenth century (Metcalf and Metcalf 2006). Modern, postcolonial India famously became the world's largest democracy, with its new constitution nonetheless retaining elements of colonial governance. Despite Hindu political and electoral dominance, India emerged as a secular state in the wake of the painful memories of partition and Mahatma Gandhi's assassination. The new political order instigated by Prime Minister Jawaharlal Nehru and his party the Indian National Congress (INC, or the Congress) ushered in an era focusing on overcoming the colonial economic backwardness by agrarian reform and a state-controlled, planned economy along socialist lines. A full-fledged socialist (or Maoist) economy was never sought after nor achieved, however, despite tight regulations, as the following quote evidences:

[o]ften little more than a tangle of permits, licenses, and credits, it never brought under its control the vast world inhabited by the petty trader and moneylender. Beneath the 'smallish socialized sector' there existed what US Ambassador (1961-1963) J.K. Galbraith once called 'the world's greatest example of functioning anarchy'. (Metcalf and Metcalf 2006, p. 246-247)

Even if aspects of the inefficient socialist regime endured, economic liberalisation opened up the country to the global multimedia and consumer culture. Notwithstanding an increasing urban middleclass, the income inequality gap has continued to widen since liberalisation, dividing India into ‘a land of two economies’ (ibid., p. 297): a cosmopolitan, luxurious and urban consumer world versus the poverty in rural areas and squatter settlements with inadequate access to primary education and healthcare. Herbs, spices, medicinal and aromatic plants, and wild and agricultural products in general often straddle this rural-urban divide as they are traded in and (again) out of towns and cities, and their regional and global flows have been fundamentally altered by advances in technology, globalisation and trade liberalisation. Lele et al. (2010) present a national overview of historical shifts in Indian state policies on ‘non-timber forest products’ (NTFPs), or ‘minor forest products (MFPs) as they are commonly referred to across South Asia, observing a considerable gap between rhetoric and reality. The overview begins by noting how British colonial forestry – with the primary objectives of maximising state revenue, supplying British industries and consolidating state control – reserved large swathes of forest for exclusive state usage, focusing mainly on timber and a number of NTFPs with significant commercial value (e.g. pine resin or *Acacia* tree gum). After independence, forests continued to be viewed as national assets as they were exploited to support the on-going industrialisation. In the 1960s, protests against the exploitative forest policies were paying off as various commissions and committees pushed for more proactive and inclusive governance towards NTFP collectors, resulting in complicated institutional arrangements particularly in the central forest belt states. Sustainability, under the form of ‘ecological balance’, only entered the agenda in 1988. In the past two decades, several pieces of legislation pronounced the devolution of ownership and control towards forest, rural and tribal communities, but actual shifts in power have not been implemented in practice or even acknowledged; most interpretations of existing forestry law still take the state to be the owner of all NTFPs.

Interestingly, the National Medicinal Plants Board (NMPB, Government of India) is absent from the abovementioned review. Founded in November 2000, its ‘Central Sector Scheme for Conservation, Development, and Sustainable Management of Medicinal Plants’ was

approved by the Government in 2008, and is now in its second, expanded edition (NMPB 2015). In 2009, and in collaboration with WHO, NMPB also produced India-specific Good Agricultural Practices (GAP) and Good Field Collection Practices (GFCP) for medicinal plants in an attempt to educate industry stakeholders, and therefore ensure quality and sustainability. Based on interviews and documentary analysis, Gaudillière (2014) elucidates how NMPB and its cultivation policies have contributed to the creation, regulation and pharmaceuticalisation of a 'National Plant Market'. He comments how the introduction of the Priority Species List – based not on medicinal benefit but on market indicators for demand – indicated the start of a new kind of federal policy, aiming to integrate the domains of forestry, agriculture, industrial pharmacy and the provision of health. But as NMPB did not succeed in improving the medicinal plant supply (evaluated in the available quantities of raw materials) within the first decade of its operations, its usefulness was highly contested in parliament in 2009 and 2010. Its focus on agricultural promotion and management had been a failure, with the lack of follow-up assessments and the mismatch between market prices and cultivation dynamics being major issues. Nevertheless, this new and emerging institutional landscape of agro-technical standardisation has led to increasing authority of a new group of scientists and experts, which further industrialised medicinal plant regulation. Clinical actors and medical concerns are increasingly marginalised as pharmacy comes to be equated with the drug industry and the mass-production and management of medicinal plants.

Between 1998 and 2008 four national reports on India's medicinal plant trade were published. Possibly the first report of its kind and published under the auspices of the Canadian International Development Research Centre (IDRC) and the Medicinal and Aromatic Plants Programme in Asia (MAPPA, initially supported by the Ford Foundation), *The Medicinal Plants Sector in India* (Holley and Cherla 1998) is based on official macro-level trade data and micro-case studies available in the literature, as well as discussions with experts in the field. In summary, the report concludes that India may be the largest supplier of raw materials globally (with many untapped opportunities) but that the sector is mostly informal (but functional) and based on wild-harvest which is unsustainable (with a declining resource base) and inequitable. Interestingly, Holley and Cherla (1998) note that

the sheer number of medicinal plants and the extreme diversity of stakeholders are actually not part of a single (formal) sector. Instead, they span across and beyond forestry, agriculture, healthcare and industry. The authors further note that there is an insufficient knowledge base for adequate and strategic development particularly from a socio-economic perspective, as well as a tendency to oversimplify the market. Recommended interventions towards achieving an equitable and thriving medicinal plant industry involve setting-up a national and representative authority or board (i.e. the NMPB, founded in 2000), strengthening cooperatives and importantly the formalisation and organisation of the market:

A key task is to bring a greater degree of formality and organization to a market which has been shown to be inefficient, imperfect, informal, and opportunistic. If a greater degree of formality cannot be achieved in the market, it is unlikely that other efforts will be of significant use in preserving traditional medicine and its resource base. The call for formality is not, however, a call for state intervention per se; nor is it a call for a Marketing Board, as some have suggested. (Holley and Cherla 1998, p. 77)

Carrying on in the same vein, Subrat et al. (2002) published a second national report. It covers the country's Ayurvedic medicine industry, and is based on interviews with representatives from industry and research institutions, supplemented with a questionnaire sent to the largest manufacturers, and field data collection on trade volumes and prices in major cities. They assessed the then-current state as follows:

Adjectives that most readily come to the mind while attempting to describe the nature of the medicinal plants trade in India are 'extremely complex', 'secretive', 'traditional', 'confusing', 'badly organised', 'highly under-estimated' and 'unregulated'. There is no macro level data/information available for assessing the nature and extent of the trade; whatever is available comprises 'guesstimates' or extrapolations based on micro studies. There is no systematic local, regional or national level data regarding number of species traded<sup>36</sup>, volumes, prices etc. with any one agency. Most of the data is disjointed, scattered, grossly inadequate and incomparable. (Subrat et al. 2002, p. 23)

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<sup>36</sup> A considerable part of the problem with assessing species-level trade is the unreliability of the equivalence between trade and botanical names, as was also identified by Subrat et. al (2002). I discussed this issue for Tibetan medicinal plants in Chapter 1.

More than eight thousand licensed Ayurvedic manufacturing units were found, but that number should be more than doubled to include the many small-scale, unlicensed cottage industries. The overall turnover of the industry was estimated at Rs. 45 billion (roughly 672 million USD) in the year 1998. The formal section of the sector is dominated by a small number of very large companies of which the sales of the top four reached above one billion rupees (roughly 15 million USD) in 1998-1999, while the biggest (Dabur India Ltd) was worth more than three billion INR. All transactions carried out with and by wholesalers are nonetheless informal and without written contracts. The three most common plant ingredients in Ayurvedic formulas are the fruits of *Terminalia chebula*, *T. bellerica* and *Emblica officinalis*, although roots are the most often-used plant part (estimated 29,6%) and herbs the most common plant habit (more than 50%). Of the roughly 500 species in commercial trade, only ten percent is cultivated in private fields. This includes well-known herbs and spices such as ginger, coriander, curcuma and garlic. The main supply channel starts with the collector, who sells her/his harvest on to a local agent in the village. This agent then sells his goods at the nearest 'mandi' (minor market) to a trader or wholesaler, who transports it to a major market, where it is sold again to larger wholesale dealers or exporters (who bring it to the main market), or retailers, often via a commission agent. Delhi is the main market of Northern India, and the second-largest exporting city after Mumbai, while Amritsar is the major market of the Punjab. Between 1998 and 2000 up to 500 metric tons of *T. chebula* was traded yearly in Delhi. For these dried fruits, villagers received 7-8 Rs./kg (0.10-0.12 USD) on average, agents or middlemen 9 Rs. (0.13 USD), the regional commission agent 12 Rs. (0.18 USD), the commission agent in Delhi 15 Rs. (0.22 USD), and the wholesaler 20-22 Rs. (0.30-0.33 USD) The final price for which they were sold by traders or retailers was then 27 Rs. per kg (0.40 USD). This means that collectors got a 26-30% share of the final price for this product.

The third report, Nagpal and Karki (2004)'s desk-based study of secondary resources (again under IDRC and MAPPA), once more confirms India as a key player at the heart of the South Asian trade in MADPs (Medicinal, Aromatic and Dye Plants) in unprocessed form. As was equally noted by Subrat et al. (2002), a huge demand-supply gap was noted in India for high-value, low-volume South Asian products. A factor fifty difference for Himalayan species such as *Dactylorhiza hatagirea*, *Gentiana kurroo* and *Picrorhiza kurroa* was

estimated, confirming the importance of trade with neighbouring countries and especially Nepal (and via Kathmandu with Lhasa). Interestingly, Nagpal and Karki describe the trade structure as highly secretive, but well-organised (as opposed to Subrat et al. 2002), albeit through strong informal business networks and almost exclusively without reliance on formal documentation.

Fourthly, Ved and Goraya's (2008) short-term study is the most recent with a national focus. It was funded by NMPB and carried out by staff of the Foundation for Revitalization of Local Health Traditions (FRLHT, based in Bangalore/Bengaluru). Relying on literature review and fieldwork (surveys of a sample of trade centres and rural households and visits to cultivation sites), it reports 9,500 registered herbal industries (1,500 more than Subrat et al. 2000, who focused on Ayurveda) and attempts to give a comprehensive list of 960 medicinal plant taxa (source of 1289 botanical raw materials) in trade, of which 176 species are in high trade (> 100 metric tons annually). Annual demand was estimated at 319,500 metric tons of dried crude materials for 2005-2006, of which 177,000 (55%) from the domestic industry, 86,000 (21%) from rural households, and 56,500 (18%, based on 2004-2005) from exports. 'Amla' (*Emblica officinalis*, dried fruit) is most important for domestic consumption, while Psyllium seed husks (*Plantago ovata*), Senna (leaves and pods), Henna (*Lawsonia inermis*, leaves and powder), and myrobalans account for nearly 70% of the total crude plant exports by volume.

Because of the large trade volumes presented above, medicinal plants have been given a central role in conservation and development. The manipulation of markets and commercial trade for the benefit of both people (especially 'poor, ignorant and exploited collectors') and 'endangered' plants – or more cynically to increase state control and revenues – has gained centre stage. In relation to this, Larsen and Olsen (2007) have identified four commonly held assumptions concerning Himalayan medicinal plant trade and conservation based on a survey of 175 collectors, traders and government staff (Larsen and Smith 2004) and on a literature review of 119 publications by researchers, (I)NGO's

and policy makers from Nepal<sup>37</sup>: (1) overall degradation of the resource base due to rising demand, (2) the prevalence of open-access harvesting, (3) cultivation as the optimal solution, and that (4) harvesters are cheated by middlemen. None of these preconceptions turned out to be well supported by empirical evidence. Although there are certainly reasons to be concerned about the conservation of certain Himalayan MAPs, we should be critical about the validity of the assumptions on which these concerns are based and on what these imply for people. These perceptions of rural irresponsibility ('poor, ignorant and exploited collectors') and overharvesting – both seen in relation to rising demand – seem to get perpetuated without much evaluation and are validating authoritarian policy interventions in the trade and conservation of Himalayan plants. This has in turn led to widespread illegal rent-seeking (Larsen and Olsen 2007). The current situation in some ways resembles the flawed theory of 'Himalayan environmental degradation' (Forsyth, 1998). This time it is not upland Nepali farmers, but harvesters who are the proclaimed culprits. Even though a whole suite of governmental and non-governmental institutions aims to understand and streamline the herbal industry, it often remains unfathomable. Studies alternatively emphasise its elaborate organisational structure (usually in the form of supply chains) or the rampant secrecy, chaos, illegality and corruption. These are two sides of the same coin, and cannot be easily correlated with macro/micro or outsider/insider perspectives. There have been some more recent efforts to come to terms with this two-sided nature. Pauls and Franz analyse the medicinal plant production network within Uttarakhand, aiming to identify how (partly) clandestine entities and structures constrain cultivation and rural development. They problematise the 'the hidden embeddedness of middlemen' (Pauls and Franz 2013, p. 229) in overcoming illegality, and their ability to bypass taxation and certification systems. The so-called middlemen are said to act as patrons and service providers to small farmers while at the same time exploiting their lack of understanding of the trade (of prices, structure, and even what is legal). They further note that local norms may not consider illegal practices to be illegitimate. Including non-commercial and informal actors in the production network brings us one step closer to a more holistic insight (Figure 2.3).

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<sup>37</sup> A preliminary survey by the same authors has found the same assumptions in the literature on India and Pakistan, a finding confirmed by my own literature search and fieldwork. The medicinal plant trade of Nepal has been studied most extensively and systematically, possibly introducing a biased view of Himalayan trade.

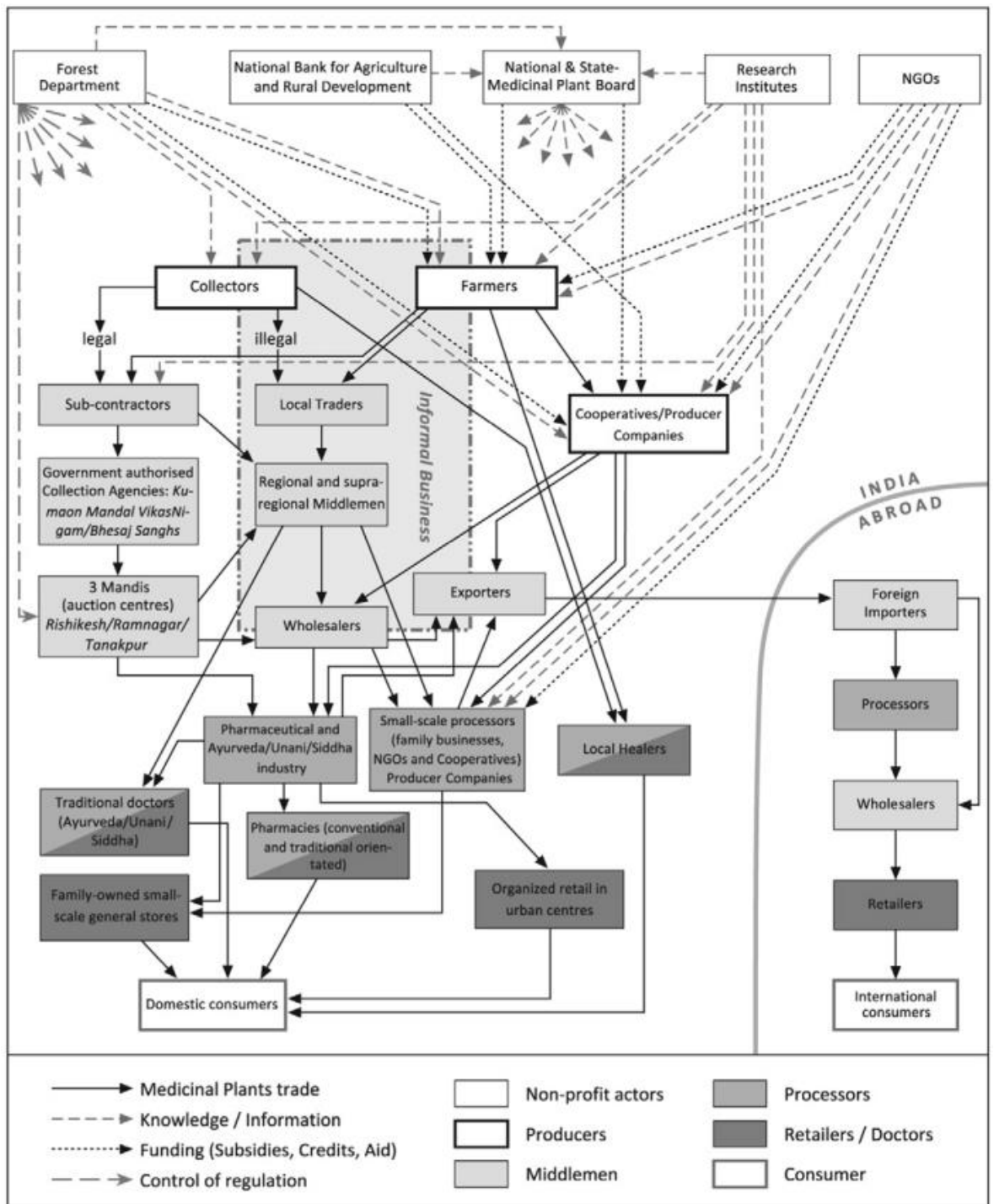


Figure 2.3. Uttarakhand's medicinal plant production network according to Pauls and Franz (2013, p. 233).

However, I intend to question the facile correlation of the legal with the formal, and the illegal with the informal, by exposing the ambiguities of current regulations and corrupt practices in state institutions, showing how traders are obliged to navigate across boundaries. Pauls and Franz indicate in their graph that collectors, farmers, wholesalers



and exporters are on this in/formal edge. I expand on this by arguing that all actors are 'walking in the dark' (ibid., p. 232), blurring distinctions between the informal and formal economies. Dejouhanet makes a similar argument for the Ayurvedic industry in Kerala (South India), which growth is slowing down as raw material prices have risen inordinately. She notes a shift from the use of fresh materials from nearby areas towards more dried herbs (called 'bazaar drugs') being used that are sourced from farther away, evidencing the flexibility of traditional formulas in the face of market constraints and opportunities. The monopolistic, integrated government supply chain set up at the end of the 1970s in Kerala excluded non-tribal collectors, local middlemen and private merchants, thereby creating an illegal sector that organised itself (much more flexibly) and subsequently overtook (and partly appropriated) the official system in importance, as most manufacturers came to largely rely on their own informal supply networks. But as the supply area expanded to make up for the dwindling availability, the gap between collectors and manufacturers widened. This segmentation not only inhibits oversight by manufacturers and the potential implementation of sustainable harvesting practices, but also increases the number, and bargaining power, of middlemen, which in turn reduces incentives for local collectors (Dejouhanet 2014a). The paradox of Indian medicinal plant trade – that the principal commercialisation networks that run in parallel with the highly regulated system are not recognised by the state and therefore characterised by opacity – forced Dejouhanet (2014b) to think beyond the informal/formal dichotomy. In the official, state-sanctioned scheme, materials are only provided to the private sector via regional auction if there is a surplus remaining after the public industries have taken their share. But when mapping the real fluxes of these products from collector's villages and local commercial outlets, no simple distinctions between public and private were apparent. In this, stock keepers with a savvy eye for business play a dual, and in the eyes of the state, dubious role by supplying both sectors, creating hybrid networks. The messy intricacies and implications of this quasi-formal business reality are often glossed over in NTFP analyses and trade surveys, or perhaps mentioned as a source of reduced data reliability. The function of these studies is exactly to elucidate and clarify, or at least to indicate potential policy actions in this direction. In what follows, I swim against the tide, highlighting the convoluted and labyrinthine nature of Indian medicinal plant trade through my own experiences in markets and with traders.

## 2.3 Domestic business-as-usual: a quasi-formal economy

### 2.3.1 The large wholesale markets of Delhi and Amritsar

As I related at the outset of this chapter, it is easy to get lost, overwhelmed and misled in Delhi's spice market. In Amritsar, I encountered similar things. Close to Muslim-dominated Pakistan (hence the large number of Unani medicine practitioners, called *hakim*) and particularly well-known for its Himalayan herbs coming from the bordering states of Jammu and Kashmir, Himachal Pradesh, and Uttarakhand, Amritsar's *materia medica* 'market' (called Majith Mandi) is actually spread out over a network of narrow streets and alleys near Harmandir Sahib, the famous Sikh Golden Temple.

Over the loud sounds of rickshaw horns and while sweating from a dust heat index of forty-eight degrees Celsius and drinking copious amounts of chai, I learned that here too long-established relations are the trusted norm: 'where my great-grandfather was taking medicine from his great-grandfather', as a local Ayurvedic *vaidya* confirmed (Audio recording 107). There is much distrust. Practitioners who have their own small pharmacies accuse large for-profit companies of leaving out essential ingredients or opting for sub-standard quality, comparing market prices for raw materials with the sometimes surprisingly cheap commercial products that are supposed to contain them. Nonetheless, it is practically unheard of to ask wholesalers about their sources as a returning customer ('it is their business', diary, 4 July 2015), let alone as an outsider ('that is our trade secret, please don't ask that. It is our understanding with them', Audio recording 106). Without prior expert knowledge, obtaining high-quality herbs for a good price is a lost cause, as a trader who has been in business for more than fifty years (and his father and grandfather before him since 1819), and who has been selling to Tibetans for forty years ensured me.

You will know about that after quite a long time. From experience. You have to select a good shop to buy good things, I am telling you frankly. In India they show you something and give you something [else]. [...] A new person can't do business in these herbs. Only with experience you can do this. [Otherwise,] you will see all things are same, but they are not, they are different.

These seasoned wholesalers may visit important clients but have no need to travel to sourcing areas themselves, instead relying on commission agents, who themselves work with an extended network of intermediaries. Enquiring about costus provided mixed reactions. Although it was still widely available, it was costly and sensitive. Rather vaguely aware of its legal status ('you need a license to sell it', 'it is banned'), I was told it would be illegal for me to carry it home. 'But do you still want a sample?'



Figure 2.4. Third and fourth generation storekeepers in Amritsar's Majith Mandi, with two shop assistants (front left and background). Photograph taken by the author on 4 July 2015.

### 2.3.2 An exporter in Gurgaon

Before I met this exporter in person, I was ensured at PADMA that Dr Anton Saini<sup>38</sup> would be an easy-going person to talk to (Audio recording 61). Part of the gardener sub-caste by

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<sup>38</sup> In contrast to the rest of the thesis, pseudonyms are used in this chapter in order not to reveal the exact identity and whereabouts of traders, to protect them and their relations from any possible negative

birth, he had studied botany in Germany (hence his first name) and obtained a doctoral degree in plant pathology. After that, he had worked as a consultant for the Swiss multinational Sandoz (which later became Novartis), writing a report on the precarious state of the agricultural sector in India. Along the way he became interested in medicinal plant cultivation as a potentially pesticide-free income alternative for farmers. Pursuing this interest with a critical mind but as a newcomer, Anton learned a lot about the herbal industry the hard way (see section 2.4). A friend suggested that he should make use his expertise by going into medicinal plant exports. He first contacted PADMA in 2003 and was consecutively employed as a consultant between 2004 and 2006, gathering information and herbarium specimens of PADMA 28 ingredients growing in India. Because of his friendly nature, scientific background, and familiarity with both Europe and India, he became an essential transcultural middleman and supplier. Dr Saini had returned to his parental home in Gurgaon to have a family after his studies. It was there that I first met him (Fieldnotes VII, Audio recording 70, 3 March 2014).

Gurgaon city can be reached with the Delhi metro in less than an hour. Also called 'Millennium City', its sprawling urbanisation and numerous skyscrapers testify its role as a one of the leading financial and industrial centres of India over the last decade. Dr Saini and I had a leisurely lunch in a fancy restaurant with table linen and an extensive buffet, where we discussed his work with PADMA. He regularly exports dried myrobalan fruits (*Terminalia chebula*), pomegranate seeds (*Punica granatum* L.), bael fruits (*Aegle marmelos* (L.) Corrêa), cotton tree flowers (*Bombax ceiba* L.), and country mallow (*Sida cordifolia* L.). Anton sources chebulic myrobalan from the forests of Maydya Pradesh in central India, where 'tribals' collect and dry the fruits. He found that he could not trust the Delhi wholesalers, especially since he is not local (even though Gurgaon is right next to Delhi) and since he needs to supply PADMA with batches of consistent high quality (this year's harvest, with uniform colour and shape).

I never buy from them. I went to these markets; you cannot rely on them. I thought, better to go to the place where it is produced, find a local man, give him a bit more money, tell them

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consequences of my and their actions and statements. Supplier details are generally considered economically sensitive information, making secrecy a typical trait of the industry.

what material we need, and go from there. It is easier to travel there, see the material, take what you want, and take money in cash and then transport. This is what I do. We need a middleman, but not the big wholesaler.

A similar setup has worked for him for pomegranate, which grows abundantly on farmer private land on the hills of Himachal Pradesh, and for bael fruits. When the materials arrive at his place however, several days labour are often still required to manually clean, sort, and dry them further to reach PADMA's standards. After lunch, we drove over to his parental house in the much quieter and older Gurgaon village. There, he had a small herb processing unit: a shaded drying area with two fans, two storage rooms, and more space to dry herbs on top of the roof. An older man and his son who had a room on the premises were employed as care-takers, and their work was overseen by Anton's wife. For some plants however, Anton was not able to find any reliable source.

I went on a *Sida* collection trip with Anton and his most senior worker during a second visit to Gurgaon more than a year later (Fieldnotes XI, 11 August 2015). The monsoon was hitting hard, and many streets were flooded for days. While driving outside the city centre for about forty kilometres, he assured me that there was no pollution in Haryana, meaning that there was no heavy industry with smoking chimneys in the area (although the air quality is record-breakingly bad in nearby Delhi). Gurgaon is famous for its burgeoning auto, IT, and commercial industry, which are relatively clean. He admitted there was some waste disposal here and there, but said that at least it is not spoiling the air. It had initially taken him a lot of effort to locate the area to which we were headed, and to pinpoint the good patches that lay scattered across abandoned fields. Initially, he had attempted to organise a small group of local youngsters to do the harvesting but this experiment failed. They found the work too hard, harvested indiscriminately, and soon lost interest. When Anton came with his own men to collect, the locals resisted, so they looked for another spot a bit further along the road. It was vacant land, and here no questions were asked. The first time they harvested was in 2005, and the last *Sida* (Sanskrit name *bala*, Unani name *khireti*) order from PADMA that came through in 2012 was 500 kg. On a normal harvesting day, a

group of three to five men would reach the area around eleven and finish before four pm during the second half of August. Using scissors – not sickles as these are less selective – the group can gather roughly 30-35 kg of dried material a day (80% of the weight is lost during drying and sorting), so the whole operation would usually take about a month. The collectors are asked to only collect half of the plants to stimulate regeneration for later years. A worker would be paid a fixed salary of at least 400 rupees (6 USD) per day, with tea, food, transport, and processing further adding to the costs.

We arrived in the harvesting area. We drove by one of their better patches, but the recent construction of a bus stand had obliterated it. New hotels, warehouses, a school, a hospital, and a *mandir* had all been constructed over the past few years along the main road, and more was underway. Sorghum was also being cultivated in small fields. We stopped at a small shack on the roadside. Over some chai, Dr Saini noted how a yellow-flowered herbaceous plant had become much more common. He wondered why, ‘it must be some cycle’. On top of that, congress grass (*Parthenium hysterophorus* L.) – a well-known invasive species that arrived in the country with imported wheat – was increasingly dominating the landscape. The shopkeeper, dressed in a bright pink sari, agreed: she had suffered from severe allergic skin reactions after handling these plants. I joined Anton’s most senior worker on a walk to assess the amount of *Sida* remaining. This herb emits a particular smell when growing, which helps in locating patches. The land on which it grows is near an electrical power distribution hub, hence the transmission towers. The outcome was not very encouraging. Anton concluded that they probably would not be able to collect the necessary amount of one thousand kilos dried material this year, even though we located some more promising patches later on. Since there was no order for more than two years, they had lost oversight, and because the order from PADMA only recently came in there was no time left to look for alternative harvesting sites.



**Figure 2.5. Harvesting area of *Sida cordifolia* outside Gurgaon (Haryana) dominated by the toxic invasive species *Parthenium hysterophorus*.**

This failed harvesting excursion is but one example that helped me to re-evaluate the ubiquitous commercial overharvesting discourse as a small piece of a much larger puzzle: rapid urbanisation and concomitant land grabbing, invasive species, and complex interrelations between harvesting, disturbance and regeneration cycles. The collection area itself also diffuses romantic distinctions between rural and urban spaces and between wild and cultivated plants, while showing that ‘forests’ are but one amongst many sourcing habitats and that *adivasi*<sup>39</sup> are not the only harvesters. After the *Sida* plants have been fully dried, they are stored in large polyethylene bags that go into sealed drums. A transit permit is not necessary in this case, as so much traffic that crosses the Haryana state border to Delhi is export-oriented. Dr Saini has to prepare the invoice and the packing list. After

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<sup>39</sup> *Adivasi* is a Hindi umbrella term for often rural ethnic minorities. In the Indian Constitution these are categorised as ‘Scheduled Tribes’ and granted certain exclusive landrights such as the harvest of ‘Minor Forest Products’ (at least on paper, see again Lele et al. 2010).

customs, the materials travel Delhi-Mumbai by train, where it is then shipped to Hamburg. This process, however, is fraught with difficulties, as we will see in sections 2.4.

### 2.3.3 Cultivating and trading costus (and more) from Lahaul

Costus has been cultivated as a cash crop in small fields for almost a hundred years (see Figure 2.6). It was first described botanically, as a new species with a binomial name, by Dr. Hugh Falconer (1808-1865, Falconer 1841, pp. 456-457), who was the superintendent of the East India Company's botanical garden at Saharunpore (Uttar Pradesh) at the time. As was also noted by Falconer, *Saussurea costus* (Falc.) Lipsch. (now the accepted name) is endemic to a geographically restricted part of the Western Himalayas, growing wild in small patches on 2600-4000 m high moist slopes mainly in Kashmir, and perhaps also in Himachal Pradesh, Uttarakhand and Northwest Pakistan. NMPB scientists have prioritised *Saussurea costus* as one of the thirty-two 'important medicinal plants in short supply', while acknowledging the lack of empirical population data and the limitations and problems of cultivation (Kala et al. 2006). Kumar et al. (2011) researched the distribution of MAPs in Ladakh, discussing and listing endemic and endangered species and their use in common Tibetan medical formulations. Besides coming up with a technocratic model for the conservation and sustainable development of the trans-Himalayan medicinal plant sector, Kumar et al. also ranked *ruta* as the single most important trans-Himalayan medicinal plant used in Tibetan medicine, based on the number of times it was mentioned as an ingredient in available formularies (Phuntsog 2006, Tsarong 1986). It is currently cultivated in small fields by families from Lahaul Valley and Uttarakhand who obtained export permits, as well as in Ladakhi herbal gardens (cf. Blaikie 2009). Blaikie (2009) describes how well-educated, relatively young 'career amchi' are caught up in the paradox that arises from the (proto-)industrialisation of traditional medicine production, which is still largely reliant on wild-sourced raw materials. Increased production, fuelled by cultivation projects of a few species for the sake of biodiversity conservation, inescapably necessitates more harvest or purchase of many other, potentially threatened wild species which are not always easily substitutable. It also consolidates a specific model of urban clinical practice as part of medical modernisation and professionalization processes, while having ambiguous reverberations on small-scale medicine producers and rural practitioners.

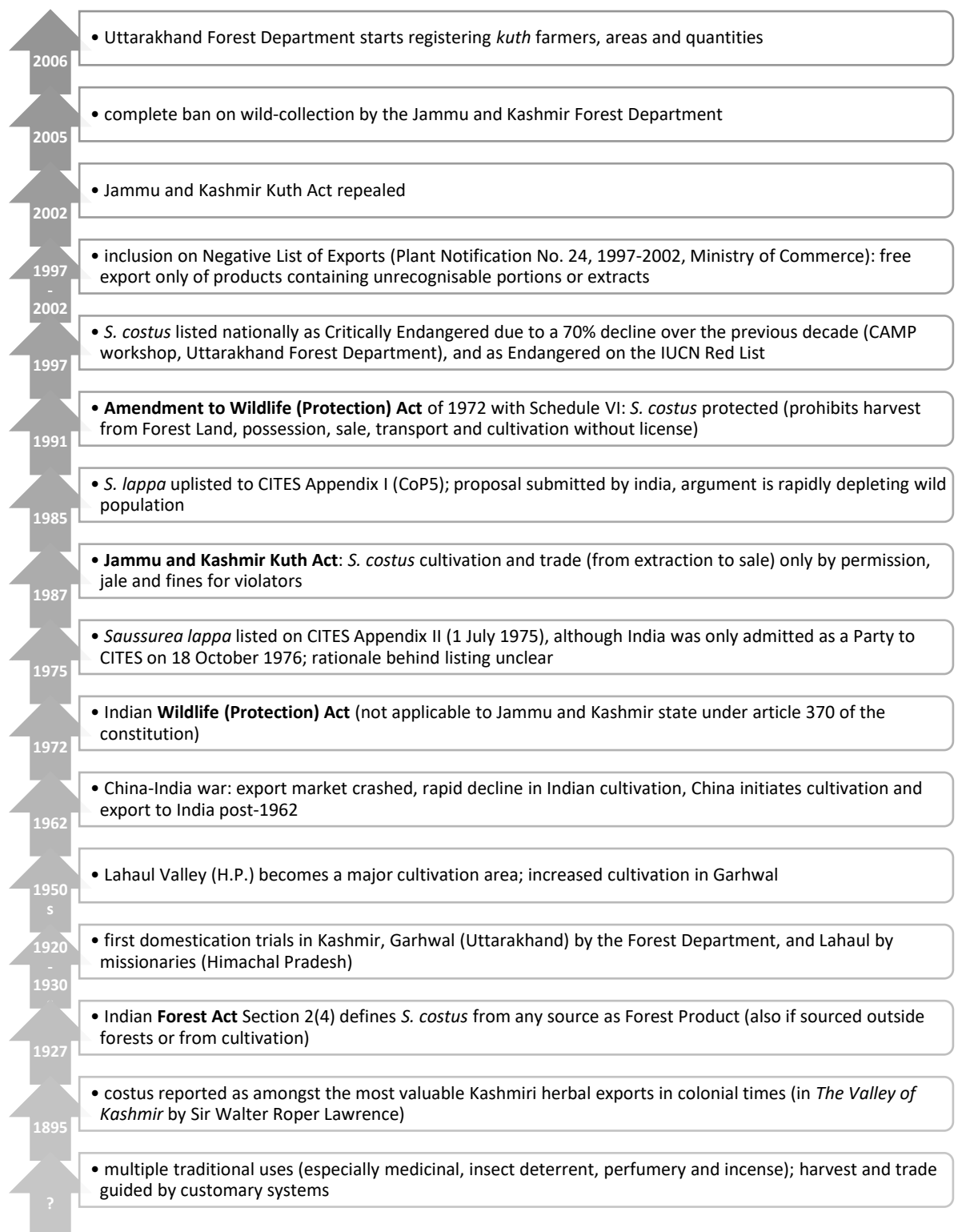


China used to be completely reliant on Indian imports, but this changed drastically after the China-India war of 1962, when Chinese cultivation commenced. According to the CITES database, China exported 1,024 tons of roots and derivative products globally between 1983 and 2009 compared to only 266 tons from India, while there is also considerable evidence for illegal trade. Described by Kuniyal et al. (2005, p. 1035) as ‘the oldest cash crop in the cold desert environment’, *kuth* (the most common Hindi name for *costus*) cultivation was found to be in a bottleneck due to factors such as the lengthy reproductive cycle (up to three years), small land holdings, and fluctuating and low market prices that led to farmers shifting to the more profitable cultivation of peas, potatoes, and hops.<sup>40</sup> Based on their *Review of the Status of Saussurea Costus*, TRAFFIC India (2011, p. 15) has concluded the following (see Kuniyal et al. 2015 for a similar opinion):

[t]here is little evidence to suggest that the uplisting of the species into Appendix I 25 years ago has done much to conserve the species in the wild in India. [...] On the contrary, the high and often complex level of regulations has only deterred potential cultivators with the result that commercial cultivation has also not picked up. This could have served as a buffer for wild populations. [...] In the case of cultivation, there is great uncertainty whether permits will be granted or not. There is also some confusion regarding the government agency responsible for issuing the permits. This is compounded by a lack of transparency regarding the rules and regulations and an unclear process of decision-making. This has led to a situation where Indian cultivators, those who venture into *S. costus* cultivation, do not find buyers while the market is flooded with Chinese imports from cultivated sources.

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<sup>40</sup> Kuniyal et al. (2015) cites the procurement prices for *kuth* roots from these two areas, which are usually fixed on a yearly basis: 20 to 56 rupees per kg from Lahaul (0.3-0.8 USD, between 1988-1989 and 2000-2001), and 53 to 120 per kg from Uttarakhand (0.8-1.8 USD in 2007-2010). Recently the volumes harvested and marketed in Uttarakhand (2,76 metric tons on average from 2007-2010) as well as the prices seem to be on the rise again (150 INR or 2.2 USD per kg in 2011-2012). Yet these amounts are still minute compared to Indian domestic consumption, estimated to be 100-200 metric tons annually (Kuniyal et al. 2013).



**Figure 2.6. Chronological summary of the major policies impacting the harvest, cultivation and trade of *kuth* (*Saussurea costus*, synonym *S. lappa*) in India, based on a 2011 TRAFFIC information document (submitted by the CITES Secretariat at the Nineteenth Meeting of the Plants Committee, Geneva, 18-21 April 2011).**

It was *amchi* Dolkar, one of the daughters of Ama Lobsang, who introduced both Men-Tsee-Khang and PADMA to the costus grower, trader and exporter I got acquainted with in July 2015. Both described Mr Mishra to me as an honest, simple, good man. Mishra was born into a Brahmin family of four brothers and four sisters in a small hamlet along the Lahaul valley more than fifty years ago (Audio recording 112). His father owned farmlands and also cultivated some *Saussurea costus* and *Inula racemosa* (*manu* in Tibetan), just like his grandfather. He remembers taking these roots on horseback over the pass to Manali to sell them there. In seventh class, during the two-month Summer holiday, they also went into the mountains, on steep ridges, to harvest *kutki* (*hong len*). They did not know the price and would just sell it to a man from Amritsar who came to buy from them. In 1993 a researcher from Lucknow came to their village, looking for hawthorn berry shrubs. Young Mishra helped him find some plants in the vicinity, which was the beginning of a fruitful business relationship. The researcher quit university, founded his own company, and soon both men were prospering. In 1998, they started officially by securing legal documentation, which Mishra learned how to obtain from the academic. In 2005 he then started exporting costus for the French perfume industry, at first via a commission agent in Delhi. As he was new in the trade ('at that time we were not skilled') he was taken advantage of by the agent, who's profit margin was three to five times higher than his. When he found out this collaboration ended, but luckily the buyer sent him a direct purchase order later, cutting out the middleman. From then onward, he was exporting directly to companies in France, Germany, Switzerland, Yemen and Dubai. Over time he also started supplying big domestic manufacturers such as Himalaya and Organic India, as well as more Tibetan doctors in Dharamsala and Delhi. He now rents several plots of land in two hamlets deep in Lahaul valley, where a manager oversees the maintenance and harvest of the crop in the growing season (May to October). Costus is the main crop, followed by *Inula*, and a small number of far less abundant fields containing *Aconitum heterophyllum*, *Podophyllum hexandrum*, and *Picrorhiza kurroa*. He has attempted to grow *jatamansi* (*Nardostachys grandiflora*) for several years, but has failed so far. To supplement the cultivated stock, Mishra maintains contact with a network of (mostly part-time) gatherers in Ladakh and the Kulu and Chamba valleys in Himachal from whom he buys directly or via an agent. When we met, he was only selling crude, dried herbs, even though he had a small distillation unit and was very keen

to go into costus oil. He employs around seven people year-round, including his wife and daughter and several Nepali domestic workers.

A few days after we met, Mishra invited me to drive with him over Rohtang pass to his farmhouse (Diary, 27 July 2015). He was planning to attend the wedding of his older sister's grandson, and had bought a crate of Carlsberg beer and some bottles of whiskey for the occasion. We were lucky with the weather. The clear sky allowed for stunning vistas and almost made us forget the dangers of rockslides and steep cliffs. After the pass we descended from above 4000 m to around 3000 m. The vegetation changed once again, we now entered the cold desert of Lahaul. A dry, coarse wind irritated our eyes and nostrils as we endlessly opened and closed the car windows to avoid clouds of fine sand stirred up by passing trucks from entering. On the next day it took us another hour to drive twenty-five kilometers to the farm as the road condition deteriorated further the deeper we headed into the valley. After we arrived and were offered some chai, we immediately went on an inspection tour of the fields.

In the first year of costus cultivation seeds are planted in September using oxen or yak half-bloods to make gullies, and in the third year the roots are harvested in October, just before winter kicks in. The fields are partly irrigated, and have to be watered to maintain the crop. Dried cow dung is used as a natural fertiliser. Fungus and insects are no problem at this altitude. Harvesting is by hand. The same is the case for *manu*, *Inula racemosa*, which is planted in April. Both *ruta* and *manu* were growing vigorously in dense monocultures. Some fields were first year, some second, some third, to ensure there would be a crop every year. On average, Mishra can harvest between 20 and 40 metric tons a year. One average field can yield up to a ton of *ruta*. The fields are fenced or surrounded by rock walls to prevent domestic animals such as cows and goats from eating the crop.



**Figure 2.7. A field of *ruta* (*Saussurea costus*) in its third growing year. The dark greyish-black flower will develop into fruits after pollination (28 July 2015, Lahaul Valley, at about 3,000 masl).**

Upon our return, I stayed in Mishra's house and observed his work at the company for several days. In particular, I learned more about the qualms of documentation necessary to export costus, a CITES-listed species, abroad. We also attended an auction of confiscated forest items at a local forest division a few hours' drive away. The two last-mentioned activities are discussed in the next section.

#### **2.4 Behind the scenes of the *maleficium*: illegality, corruption and bribery**

Experience, trust and old connections turn out to be vital for successful business, with new traders frequently being cheated and having to learn the hard way. Scouring the streets of Khari Baoli and Majith Mandi, it comes across as if there is no effective state regulation whatsoever besides the influence of item bans on their selling price. Organising small, local harvesting parties – especially in areas where one is familiar – can also largely take place

under the radar. But interactions with state institutions and their officers cannot be avoided altogether as companies need to be registered and pay taxes, obtain legal documents and permits, and as goods pass by various checkpoints before reaching their destinations. These points of contact could be considered as nodes of formalisation, intersections where the usual informality is transformed – at least partially and temporarily – by forced official interventions that shine some light on the otherwise dark paths followed by herbs in India. The flash that produces this formal snapshot, however, often creates unrealistic artefacts that can only be dealt with by going back into the darkroom of informality. As many regulations are confusing and only partly enforced, a situation of ambivalence ensues in which reliance on the principles of an economy of favours becomes the only feasible option. In the following subsection I discuss the first-hand experiences and struggles of Dr Saini and Mr Mishra in coming to terms with state institutions and regulations and the need for documentation.

A first example, related to me by Dr Saini (Audio recording 115b), gives insight into how the need for certain paper forms encourages corruption and bribery. For export, Anton has to prove by means of receipts and purchase orders at which prices he bought and will sell his materials to satisfy the Gurgaon Excise (inland tax) and Income office. Before the last national elections (it was cancelled by ruling politicians in an attempt to win votes), it was obliged to fill in Form 38 each time raw materials were purchased from another state at a cost of more than 20,000 rupees (300 USD). Dr Saini would usually employ an accountant to take care of this, but one day he wanted to find out why his accountant asked for thousands of rupees to take care of this, even though the official rate for the five forms requested was negligible. As he arrived at the office to get the blank forms, his contact and a lawyer were already waiting. He was served tea, and waited for two hours. Finally, the officer arrived and was ready to receive them. First, he disputed that the address given was not Dr Saini's home address. But after some convincing, he backtracked. The officer invited him for some more tea. After another hour of waiting, a second officer came in. A series of more non-sense arguments followed. In the end Anton agreed to pay the officer 700 rupees (10 USD). His lawyer also wanted 200 Rs (3 USD) for his presence, and the clerk who had to process the file another 100 (1.5 USD).

It is organised. There are rates fixed for everything [...] You waste your day and still have to pay money. Or if you don't pay, you don't get the form even after three or four days [...] You cannot complain to anyone, where will you go? The highest official sitting in that building is involved in that.

'Harassment', 'unnecessary botheration', 'long queues', and 'corruption' is how Saini describes this structural violence, which is also part of exporting herbs abroad. Even though he pays someone a 'documentation fee' to arrange the permits and certificates in his place, the transit permit may already cause trouble before the consignment even reaches the customs office. Normally there are no problems at this stage, as Anton hires a specialised private company that transports the materials in sealed trucks across state borders. But about three years ago there was 'a conspiracy' between the transport manager, the driver, and an officer at the border checkpoint of Haryana. The consignment was blocked, he was summoned and asked to pay 55,000 rupees (820 USD) or alternatively 25,000 rupees (373 USD) if no receipt would be involved. Anton requested a receipt to win time. He had made a phone call to the father-in-law of his daughter, a big boss in the administration, to settle the matter. Alas, this intervention came fifteen minutes late. He had already paid the fee. One officer came running after him, apologising and blaming the driver. Officially, the reason why the materials were confiscated was that he could not provide a receipt documenting the purchase. This was the case because the middleman who organised the harvest of the pomegranate seeds in two or three Himachali villages was not an authorised sales person. Getting a license and paying taxes would be difficult for this man belonging to a deprived family, who only went through basic education. The reality of the situation however, is that the large majority of all transactions in this business are cash payments without receipts. The law is only strictly applied arbitrarily when local bureaucrats want a piece of the cake: 'It is a big trouble in India, to be a tax payer: the system is corrupt!'

A third example narrated by Dr Saini of failed state involvement in the medicinal plant sector revolved around cultivation subsidies for farmers. As a botanist and agricultural scientist, he was initially genuinely interested in promoting organic cultivation of herbs as an alternative, pesticide-free income strategy for farmers. He soon abandoned this idea completely. One trader even told him directly 'please don't advise any farmer to cultivate

[medicinal plants]’, as big wholesalers ‘are supporting two hundred families, they owe them’. ‘If I start buying from farmers, what will happen to the families which have been working with them for hundreds of years. It is the local people still who collect. It works better I think’ (Audio recording 70). Nonetheless, Dr Saini discovered that ‘cunning, dishonest money-minded private consultants’ were promoting the cultivation of expensive herbs to farmers and making a good business out of selling seedlings. But after two to three years of growing nobody was interested in buying the crop, especially since it was often available cheaper wild-sourced on the market (Audio recording 115). On top of that, government subsidies to support farmers who cultivate medicinal plants were abused by corrupt entrepreneurs. At the mortgage bank that finances cultivation projects, Anton learned about how a loan could be obtained and what the charges and profit levels would be. But the banker did not want to give him details on who was cultivating what, how much and where. Even if on paper ten hectares would be in cultivation, in reality there would only be a few plants there, as Anton saw later with his own eyes. The local department of horticulture inspector who has to supply a certificate was also involved in this lucrative business, sharing the subsidy money with the bankers, consultants, nurserymen, and so on. As a result, only ‘fake people that submit fake papers’ would be granted funds, not benefitting farmers (let alone biodiversity) at all. Nevertheless, Dr Saini maintains that the government is at least making some progress, hoping that current Prime Minister Narendra Modi will keep some of his promises.

Mr Mishra related very similar experiences in his dealings with the NMPB, AYUSH, forest department offices, and the wildlife crime control bureau in Delhi. He had tried to contact AYUSH for a long time (Audio recording 114). I saw a pamphlet in his office advertising a Centrally Assisted Scheme that provides financial assistance for the cultivation of medicinal plants. Even though he is formally cultivating, trading and exporting a critically endangered plant, he was unsuccessful in getting any support, or even a written response to his queries. Mishra’s explanation is that:

Only if you know a good politician, then you will find benefits. These people are so dirty, the people who are running the Indian country: politicians and bureaucrats. Both are corrupted. [...] Every Indian says ‘we are independent’. The people are not, only two [groups of people



are]. Who? One is the bureaucrat, one is the politician. They are doing everything, and have lots of money. Laws are nothing [to them], they make the law! The law is for poor people.

He made clear that AYUSH has no influence on his work, all their schemes and guidelines remain in the realm of paper. The forest department on the other hand does enforce rules and regulations, and sales taxes have to be paid even though export itself is free. Harvesting permits specify the what, when, where, how much and by whom of wild-collection. These should be obtained from the local forest officer, who confirms which areas are open for harvest. The problem here is that many high-value plants such as *Nardostachys (pangpö)*, *Neopicrorhiza (honglen)* and *Dactylorhiza (wanglak)* are rare and only grow in specific, restricted habitats. It is therefore likely that one obtains a permit for an area that is 'open to harvest' but where the species you are after don't even grow. The forest officer may be aware that there is nothing in that area, but can be swayed with a bribe. As there is no effective policing of the often difficult-to-reach harvesting areas themselves, the collection party is free to harvest in a neighbouring 'closed area'. Mishra ensured me that this is a common strategy (Audio recording 112), only a tiny portion of wild-collection is legal and most harvesters not even bothering to get approval anyway.

After we had returned from our road trip to Lahaul, I was staying at the Mishra family residence for a while. On the third day, we drove past Mandi to Gohar, where forest items confiscated by the Nachan Forest Division (FD) of Himachal Pradesh were being sold by auction (Fieldnotes XI, 5 August 2015). Mr Mishra had received an official notification letter from the forest department which listed what was on offer: a dozen quintels of *Taxus baccata* leaves and *Berberis aristata* roots. He had predicted that the quality of these goods would be poor and added that most buyers would only be interested anyway in the 'very good documents' that came with the purchase. They could then burn the original goods or get rid of them cheaply on the domestic market, and replace it with high-quality material sourced illegally from elsewhere for which they now had official export documents. Indeed, the *Berberis* roots were lying piled up outside in the open air on the soil of a courtyard in Mandi. This would negatively affect its berberine content, the yellow-coloured alkaloid that is commercially extracted from the roots. The Forest Division in Gohar was situated in a well-maintained garden of trees and flower patches and consisted of offices, a residence,

a parking space and a store. The staff consisted of a few forest officers (FOs) in uniform, clerks, assistants, workers and several armed guards. I was not allowed to accompany Mishra into the office, where he had to negotiate with the FO. In the end, it turned out he was the only potential buyer. The other people around were only there for timber. He sighed:

There is no system at all here in India. The FD captures goods and just dumps them somewhere. It is like taking an apple out of someone's hand and then throwing it [away]. The FO is also not knowledgeable on herbal trade. He only wanted to provide a transport permit to Delhi or Amritsar, but I need a legal procurement certificate as well since this is required by my buyer [a commercial extractor]. He had never issued that before and had to make enquiries first.

While Anton deputes someone to take care of export documents, Mr Mishra takes care of that himself in Delhi. There he has to interact with five separate offices before the materials can go through customs. Certificates of Origin, Non-Objection Certificates (NOCs), phytosanitary documentation, CITES, and tax exemptions all have to be arranged (Audio recording 113). The more people are involved, the worse it becomes:

We have everything. We have the net, mobile, laptop, but it's useless! You have to go personally. Sometimes [there is a] corrupted officer, they want something. 'Where is your invoice?' 'This is your invoice! Ooooh, a lot of money. What is [in there] for me?' [...] Everyone sees the invoice. This man is exporting for 40,000 euro. They don't know how we obtained this. He thinks, 'he purchased this at some little cost, wants to send and get a big profit. [...] This is a big problem.

The frustrating bureaucratic encounters I have sketched above are just some of the many stories I gathered during my fieldwork. Non-Indians who are economically active in these areas befall the same misfortune, and perhaps worse. An academically trained UK citizen who lived in Kullu valley for more than a decade and became friends with Mishra told me why eventually he had to give up his CITES-listed medicinal plant cultivation business (Audio recording 117).

Generally speaking, they [bureaucrats] aren't comfortable in offering the usual solutions to a foreigner. They don't know how we are going to respond; with whom we are connected. We are a kind of wildcard. On one hand they expect us to do it properly, on the other hand they don't know how to do it properly. There is no system.

Mr Mishra on the other hand as a Brahmin Indian from a modest background (but importantly, with land) had figured out his own system, had long-established connections and had been able to register his farms as CITES nurseries in the wake of a special conference on the topic that had created a window of opportunity. The sentiment that there is no functioning system was a recurring theme in my interviews. The formal trade channels are practically nearly impossible to navigate as a private trader (and particularly exporter) without resorting to informal exchanges and economies of favours to get through the highly dysfunctional bureaucracy. Dr Saini and Mr Mishra blame corruption for this sorry state of affairs while official policies and surveys lament the informal, secretive and unsustainable nature of the trade, labeling harvesters and cultivators as ignorant, middlemen as parasitic and wholesalers as greedy.

## 2.5 Failed formalisation: the Dark Art of sourcing, the blinding light of governance

Government interventions in the lives of NTFPs have generally made things worse for both people and plants (Laird et al. 2010). Formalisation – defined as ‘the replacement of informal ownership, access, and economic activity through the recognition and inscription by the State of rights and conditions of access’ (Putzel et al. 2015, p. 457) – is a defining characteristic of NTFPs globally as well as the Indian medicinal plant sector. Trade surveys indicate that conservation-development discourses have fostered a set of unfounded assumptions on the nature of this sector that motivate continued top-down intervention. Yet despite these attempts and its growing economic importance, the trade remains overwhelmingly informal, poorly understood and badly regulated. Indeed, formalisation ‘is often unsuccessful and entails risks including leakage, barriers to small or poor actors, elite capture, and negative effects on women or marginalized groups’ (ibid., p. 453). My aim in this chapter was – ironically – to document the informal, shadowy realities of the Indian herbal industry and to showcase its paradoxical interactions with state regulations and

their local enforcers and bookkeepers. In line with Wynberg et al.'s (2015) findings in Southern Africa (and several more studies mentioned by them), many actors sought alternative economic opportunities and a lighter regulatory load in the face of strict measures, becoming creative *bricoleurs* (as described by Ingram et al. 2015) for forest governance in Cameroon) of the multi-layered and overlapping institutional-regulatory landscape by necessity. Ingram et al. (2015, p. 50) therefore count 'institutionalised corruption' and the resulting malgovernance as a distinct but parallel NTFP governance chain or layer 'shadowing and nested around statutory and customary structures', and ranging 'from additional payments "to get things done" in business, to elites engaging in state and power capture, and as a deliberate strategy of clientelism by state officials and traditional authorities'.

This kind of governance flourishes when formal regulations and bureaucratic procedures are unknown, vague or arbitrarily enforced. Moreover, identical national policies may lead to varied and multiple governance arrangements for different products in different socio-economic contexts and regions with corruption varying from case to case but often increasing for highly regulated, high-value and high-volume forest products such as costus, diminishing the perceived legitimacy of statutory law enforcement. The traders I introduced in this chapter were all crafting their own chains, filling in voids in the pluralist patchwork of regulations in unpredictable ways. Correspondingly, I see corruption not merely as the cause of failed state control, but as a systemic symptom of weak (mis)governance and cumbersome legislations and policies. Regulations can become tools of corruption as they are entangled with rent-seeking behaviour that privileges illegality, blurring distinctions between public/formal/licit versus private/informal/illicit activities.

As such, blaming 'ignorant' harvesters, 'parasitic' middlemen or 'exploitative' wholesalers for the current state of the 'sector' seems partial to say the least. In a highly dysfunctional and corrupt state bureaucracy where formality becomes a mere formality, government officials are in a powerful, lucrative position. On the other hand, as gatekeepers these men have to perform magical transformations from informality to legality, which is the only way

to keep the industry going. The current regulatory and bureaucratic structures overlook and/or criminalise many transactions as 'illegal', whereas traders and officials on the ground cannot but recognise their ubiquity and the necessity of these inputs and outputs for the functionality of the domestic and international markets. In this business-as-usual reality where the borders between the black and white markets are arbitrarily determined by paperwork, 'corruption' and 'bribery' are the nouns associated with the people (both officials and traders) who cross these boundaries. This white- and greenwashing operation in effect legalises the illegal in an illegal manner, bringing a formerly unknown commodity into the light. Yet considering all the steps that led to this moment, I argue that this is only a mirage, a superficial illusion. The herbal sector is at the most a quasi-formal economy. Sourcing is sorcery. Meddling in these affairs from the perspective of the enlightened regulator or NGO worker can bring even more misfortune and despair. All interested parties have to acknowledge its obscurity as a starting point to understand the tricks of the trade; its greyness, not the black-and-white ideals of documents. Governing or cultivating the wilds (Craig and Glover 2009, Craig 2012) is only possible if one concedes the true nature of the beast.

PART II

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BECOMING

### 3 Making things *with* humans: skilled interactions along the pharmaceutical assembly line

On the sunny afternoon of July 9 2013 I visited PADMA's production unit for the very first time. It was a blitz visit, guided by PADMA's owner and CEO: Dr Herbert Schwabl. He gave me a quick tour of the warehouse and offices. Walking me through PADMA *Produktion*, I got parts of an introduction I imagined Herbert had already given a hundred different interested parties (Audio recording 9).

We are in a very old building; we have rented these facilities since the Eighties. Unfortunately, the [neighbouring] houses come closer and closer, which is not very good for us. But anyway, we are here. Of course, we are highly mechanised. In total ten people are working in production: five in the offices, and five inside production. They have to do the thirty tonnes a year. It's Swiss style; it is quite small to keep the costs down. We are also inspected [by the Swiss regulatory authorities]. The packaging material has to be checked, everything. It is not just the herbs you have to concentrate on. The production process in our facility is in campaigns. We do four or five campaigns of one to three weeks of mixing and capsulation. The rest is just bringing all the materials together. It is a European problem. In Asia they have lots of people, all the time chaos. We have the chaos in our mind and are stressed. Work is so expensive here, that is the other side. The goods come here [in the storage hall], are packaged and then shipped to wholesalers in Switzerland and internationally. It's all about paper. We are all document and paper driven. This puts a lot of stress on our people. You have to be a manual worker and at the same time look for papers here, for figures there, sign the protocol. You cannot use anymore this old-style blue collar worker who doesn't care about paper. He has to know, and at the same time lift heavy stuff. It is one of the problems of European production.

This chapter aims to foreground ‘non-humans’ – plants and machines in particular – as part of the material, skilled processes of the mass-production of Tibetan medicines at PADMA.<sup>41</sup> This creative process lies at the junction between the worlds of plants and medicines, ingredients and products, as well as between (typically romanticised) nature and (scientific) technology. It is a case study of the pragmatic practicalities and limitations of the standardisation and innovation inherent in the manufacture of industrially reformulated ‘traditional’ multicomponent medicines (Pordié and Gaudillière 2014a). Building particularly on Tim Ingold’s musings on materials, skill, and technology, I contend that enskilled operators in tandem with machines play a central role in crossing these intersections through a coming-together of material, mechanical and sensorial interactions, enabling the pharmaceutical transformation of plants to take place. Through this lens, and by providing ‘thick’ descriptions and extensive quotations as well as some photographs, I also attempt to bring the insider view of the manufacturers themselves into the picture, a perspective that is all but absent within the social sciences. As will hopefully become clear, this endeavour unveils the partiality of certain stereotypes pertaining to processes and members within this industry, including the flawlessly mechanistic nature of the pharmaceutical assembly line and the predominance of robot-like unskilled labour.

Methodologically – but characteristically spilling over into theory formation and fieldwork practice – I draw on Douglas Holmes and George Marcus’s (2012) most recent take on para-ethnography, and particularly its application in research on/with contemporary, modern organisations (Islam 2015). This re-functioned ethnography shifts its purpose from description topped with a layer of anthropological ‘critique’, to an engagement with ‘the para-ethnographic practices of our subjects’ and the ‘deferral to the subject’s modes of

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<sup>41</sup> Although this chapter on production focuses on PADMA, it would have been possible to build a similar argument based on my work beyond the iron gate of Men-Tsee-Khang’s Pharmaceutical Department. By coincidence, I was able to observe seemingly out-of-the-ordinary interactions with materials and machines more at PADMA, and doing justice to their complexity requires my full attention here as these activities take place in an environment that is alien to most readers. Broadly speaking, the steps of production and material transformations are similar in both institutions (see also Chapter 5) even though the influence of GMP is much more pervasive at PADMA, which also houses some more technologically advanced machinery especially for air flow and temperature regulation as well as for instance the software-operated encapsulation machine. Electrical crushing, grinding and pill-making machines were already installed at Men-Tsee-Khang in 1967 (Kloos 2008), two years before PADMA was founded.



knowing' (Holmes and Marcus 2012, p. 127). In epistemic communities, the reflexive subjects already have a research-based ethos and even a (counter para-)ethnographic consciousness,<sup>42</sup> experimenting with various narratives. This overt, mutually invested dialogue and creative negotiation – or mutual appropriation – fully integrates the analytical acumen of collaborator-subjects (instead of 'others'). Developed from within the complex 'collaboratories' (Finholt 2002) of organisations in the global information age of knowledge economies, para-ethnography is eminently applicable to these settings. As a de-centred organisational ethnographer (cf. Islam 2015), I engage in this quasi-peer participatory story-telling side-by-side with Herbert Schwabl. This Austrian man (born 1961) with a longstanding interest in the green political movement and urban sustainability obtained a doctoral degree in physics at Technical University of Vienna and then moved to Switzerland with his wife (1994), who studied chemistry, to take over PADMA in 1998. He enjoys Baroque classical music. His true passion, however, lies in theoretical quantum mechanics (on which he has co-authored several academic journal articles 'with friends'), and in the groundbreaking but largely undervalued work of the Chilean neuroscientist, biologist and philosopher Francisco Varela (1946-2001, who cofounded The Mind and Life Institute in 1987) on autopoiesis and second-order cybernetics. Varela influenced systems theory, and Herbert has recently applied this network perspective to explain the complex multi-level interactive effects of multi-compound Tibetan medicines as 'pleiotropic signatures' (Schwabl et al. 2013)<sup>43</sup> in what he sees as a logical confluence of his interests. For more than two decades, he has also been very politically engaged; first as a representative of Swiss herbal medicine producers ([www.svkh.ch](http://www.svkh.ch)), then pushing for state recognition of and support for complementary and alternative medicine (CAM), and later lobbying for the CAM community at European institutions (see Chapter 6). In relation to this, Herbert has published on the nefarious impacts of European pharmaceutical and food regulation on bringing Tibetan and multi-compound herbal medicines on the market (Schwabl 2009,

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<sup>42</sup> In this light, anthropologist Martin Saxon may be considered an informant for PADMA as his excellent documentary work (Saxon 2004) on the Badmajews and PADMA's illustrious history now serves not only as a marketing tool but also in PADMA's self-conceived narratives of tradition and innovation (see Chapter 6).

<sup>43</sup> Schwabl et al. (2013, p. 35) explain that '[a] drug signature represents the physicochemical stimuli that cause a reaction by the system [i.e. the human body], as well as the cross-links by which the entire connected system is affected at all levels. Phytotherapeutics, which chemically represent multi-component mixtures, have especially complex signatures. As multi-target medicines with a pleiotropic effect profile [consisting of multiple, independent mechanisms], they therapeutically affect different levels of the network, which is why they are also referred to as network medicines.'

2013; Schwabl and Vennos 2015). Having led PADMA and interacted with anthropologists and Tibetan and European practitioners of Sowa Rigpa (as well as with Men-Tsee-Khang) for years, he is the more experienced researcher and at times it felt like he was handing me full-fledged critical analyses on a plate. An important part of this para-ethnographic exercise thus entails an exploration of insider-outsider dynamics and the relative positioning of Herbert and myself vis-à-vis the 'other' subjects in the story, being mindful of possible gaps and contradictions. This is clearly not an organisational para-ethnography 'from below'. Even though I do not deny the reflexive voices of other PADMA employees, their background and the nature of their work engenders a partially overlapping, but less theory-driven sort of internal criticism. By relying on Herbert's expertise there may be a risk of adopting elitist managerialist ideologies, but recognising possible contradictions and critical possibilities in these otherwise hidden reflexive practices is exactly what there is to gain in the para-ethnographic bargain (Islam 2015).

But before embarking on this co-produced montage, I first go into Ingold's and allied writings on materiality, skill and technology to develop a theoretical foundation for my (our) argument. By considering PADMA products as substances-in-becoming in a responsive human-machine-substance meshwork, I expand the Ingoldian framework to the ethnographic study of pharmaceutical companies. I then briefly review the existing anthropological literature on the production of Asian scholarly medicines, further narrowing down to Tibetan medicine and previous considerations of materiality within the pharmaceutical process. Following my analysis of Tibetan medicinal plants in texts and in the trade in the previous two chapters, I now aim to bring the plants alive in a wholly different environment: enmeshed in a highly mechanised arena of pharmaceutical production in Kempten, a small village part of Wetzikon municipality in the outskirts of Zürich.

### 3.1 Materiality, agency, skill and technology: making as growth

Ingold's reflections on materiality can be traced back to the early 1980s, when he started thinking about the role of production in the differentiation between humans and non-

humans (Ingold 1983). In going beyond production as the conversion of images into objects, he envisioned producers (human or not) as engaging in mutual processes of growth with(in) their lifeworlds. Next, he aimed to undo the opposition of collection (gathering readily available stuff) and production (the manufacture of raw materials) as the two only conceivable livelihood strategies, by considering gardening – the cultivation of plants – as an act of nurturing that establishes the right conditions for growth in a degree different to collection (Ingold 2000). This view was then extended to making things: it is not just a process of mechanical transcription of a pre-conceived idea, but of growth, moving away from modernist obsessions with artificial production as a claim towards the transcendence of Nature. Building on these ideas further, he then repeatedly critiqued the concept of materiality as conceived within material culture studies (Ingold 2011, 2012, 2013b), where the materials themselves – as in the stuff things are made of – are strangely enough not part of the main picture due to an entrenched polarisation of mind versus (and over) matter. Instead of looking at the abstract ‘materiality’ of presumed solid objects that are the focus of analyses of consumption (Miller 1995, 2005), Ingold proposes to be more attentive to the properties of the materials themselves. We are all immersed in an ecological world of material fluxes<sup>44</sup>, all organisms and things are ‘hives of activity’ (Ingold 2011, p. 29). Skilled artists or artisans thus work *with* materials through practical engagement and sensory perception, and very often continue their transformation (and incorporation), started by animals and plants, through further processing and combination.<sup>45</sup> The division between growing and making, between ‘natural’ organisms and (machinic) cultural artefacts, is fluid as form is not imposed on materials but emergent in fields of relationships (see also Ingold and Hallam 2014). In the example of stone, Ingold suggests that:

Stoniness, then, is not in the stone’s ‘nature’, in its materiality. Nor is it merely in the mind of the observer or practitioner. Rather, it emerges through the stone’s involvement in its

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<sup>44</sup> In his ecology of materials, and aiming to bring objects to life, Ingold (2011) draws on James Gibson’s (1979) *Ecological approach to visual perception* (Gibson (1979), who shows that the environment – in its three components, namely medium (e.g. air transmitting visual and auditory stimuli), substances, and surfaces (the interactive interface between the former two) – *allows* us to perceive and act. This perspective also agrees to a considerable extent with Merleau-Ponty’s phenomenology (1968) in terms of the fleshy entanglement of movement and affect, and with Deleuze and Guattari’s (2004) nomadology and conception of metallurgy as the blacksmith following flows of iron (see Ingold 2012).

<sup>45</sup> Plant-people entanglements are fundamental to human existence, but plant materiality and agency have only recently been recognised more explicitly within the humanities and social sciences (Tsing 2014, van der Veen 2014).

total surroundings – including you, the observer – and from the manifold ways in which it is engaged in the currents of the lifeworld. The properties of materials, in short, are not attributes but histories. (Ingold 2011, p. 32)

In this sense, one can distinguish objects as completed form from *things* as ‘gatherings of materials in movement’ (Ingold 2012, p. 439). Ingold therefore proposes to move away from Aristotelian hylomorphism (things are created by composing matter and form) towards an appreciation of the continual emergence of form, as substances-in-becoming (morphogenesis). We have to forget chemistry and return to an alchemical understanding of materials (Ingold 2013). In this sense, the properties of materials are not just concepts but realised in skilled practices.

Ingold’s reflections on agency in relation to skill and his bringing alive of materials have led him to rethink ‘the technical’ along the same lines. The modern Western divide between the fields of ‘art’ as creative, intellectual design, and ‘technology’ as mechanical implementation, can be traced back to the advent of industrial capitalism and concurrently to a mechanistic, scientific cosmology (Ingold 2000). As part of this, the actual producer, the machine operative, is reduced to a robot-like labour unit and marginalised as the technical is pulled out of the social sphere. In reality however, Ingold argues, the operative has always remained a skilled practitioner:<sup>46</sup> able to cope with machines through technical skill, becoming intimately familiar with them and the workplace. Humans interact with machines as persons, not just as suppliers of labour-power. Even ‘fully automatic’ machines that rely on nonhuman power are not self-sustaining living organisms, and thus require maintenance and repair, often carried out by a separate and more highly esteemed class of employees called ‘engineers’ or ‘mechanics’. Following Marx, the operators are coerced to serve the machine and by extension capital in endless repetition: ‘From the employer’s point of view, tools are not made to be used by workers, rather workers are made to use tools’ (ibid., p. 309). In the most extreme form of the mechanisation and dehumanisation of production, the technology of the industrial automaton and the underlying objectifying

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<sup>46</sup> Ingold (2000) defines skilled practice as having five essential characteristics: (1) the processual emergence of intentionality and function, (2) relationality, the artisan is immersed in her/his environment, (3) qualities of judgement, dexterity and care, (4) hands-on learning, and (5) craftsmanship generating form instead of the mechanical execution of a design.

logic of science replaces enskilled technique according to Ingold. He describes this production process as machinofacture:

the shape of the product is already 'written in' to the machine, the movements of which are predetermined. The consciousness of the machine operative is, so to speak, short-circuited. Though the worker probably knows, if only from prior observation, what the product will look like, he does not actually need to know, and the product's materialisation is not at all dependent on such knowledge. (Ingold 2000, p. 310)

It comes across here as if Ingold downplays the skills of the automaton operator, or at least attributes them a different degree of skill compared to tool manual use and man or animal-powered machines. This is in opposition to the mechanical engineer, who is not part of the predetermined assembly line. In the close-up descriptions of operative-automaton co-operation that follow I aim to show that these workers do need to possess intimate technical knowledge and skill – blurring the distinction between operators (which as I argue should be considered a type of artisan) and mechanical engineers – and how machines modulate the interaction between people and plants, the products-to-be.

Cultural anthropologist Heather Paxson (2013), in her book on cheese making, notes that the artisan occupies an uneasy position in industrialised Europe and the US: a pragmatic compromise of the competing values of craftsmanship and business. In her chapter in *The Life of Cheese* entitled *The Art and Science of Craft*, she further examines what makes artisan cheese 'artisanal'. Although defined in opposition to the industrial (which is large-scale, automated, with standardised recipes, hygienically removed and scientifically quality-controlled), artisanal production nowadays equally relies on technoscientific elements and strives for consistency. Cheesemakers speak of their craft in terms of a balance between art and science. In striking this balance (and similarly to PADMA employees), tinkering, curiosity and interpretation joins practical bodily knowledge with abstract objectivism through synesthetic, ecological reasoning that belies a form of technical intimacy and a tacit understanding that scientific manuals are suggestive rather than definitive. Nevertheless, Paxson's (2013, p. 151) definition of craft includes 'producing nonstandardized objects whose natural variation adds aesthetic and commercial value to the objects, yet that conform recognizably to a pre-imagined form'. By looking closely at

PADMA's production, I contend that the development and manufacture of industrial Tibetan medicines equally relies on sensorially engaged craftsmanship. To learn about the broad ecology of cheese of which artisans themselves are a part one has to learn from the materials, which have their own emergent agency as heterogeneous assemblages.<sup>47</sup> The cheese-maker's knowledge does not only reside in the maker's body, nor in written recipes, but is inscribed onto and incorporated in its ecological environment (West 2013). Correspondingly, PADMA workers have to think with and through the interactivity of the raw materials and machines. In aiming to document this dynamic ecology of materials, I risk ignoring the rich sociopolitical, economic and symbolic dimensions of medicines that have been the hallmark of pharmaceutical anthropology and on which I elaborate more in Chapters 5 and 6.

### 3.2 State-of-the-art: production of Asian medicines

In contrast to research on the impacts of commodification and pharmaceuticalisation, marketing practices, regulations, and the vagaries of drug development, 'ethnographic studies of pharmaceutical companies are extremely rare' (Whyte et al. 2002, p. 18). The reasons why social scientists may be reluctant or have not been able to seriously study the producers – let alone the production process itself – have been listed repeatedly (Whyte et al. 2002, Abraham 2007, Busfield 2006). Although researchers on Asian *materia medica* have covered essential new ground as evidenced in the next few paragraphs, they were sometimes barred from observing the actual production process in its entirety due to economic, political or (in the case of mercury processing) even religious factors (e.g. Craig 2012; Gerke 2012, 2013; Kloos 2010). There is therefore still a lack of attention to the material flows and frictions of medicine making itself, particularly beyond the closed doors of factories.

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<sup>47</sup> In his book chapter on knowledge transmission in contemporary artisan cheesemaking, West (2013) relies on Jane Bennett's book *Vibrant Matter* (2010) to define 'assemblage', which itself builds on Deleuze and Guattari's (1987) *A Thousand Plateaus*: 'Assemblages are *ad hoc* groupings of diverse elements, of vibrant materials of sorts. Assemblages are living, throbbing confederations that are able to function despite the persistent presence of energies that confound them from within. [...] An assemblage is never a stolid block but an open-ended collective. a "non-totalizable sum". An assemblage thus not only has a distinctive history of formation but a finite life span' (Bennet 2010, p. 23-24).

As exceptions to the rule, several scholars have already ethnographically described steps in the production of Tibetan medicines in more detail and with an eye for the material. Gerke (2013) for instance, in her kaleidoscopic biography of purified mercurial ash, summarises the ‘cold taming’ of mercury as follows, based on in-depth translation work and interviews:

I later learnt that making *drangdül* involved rubbing liquid mercury (Hg) or *ngülchu* (*dngul chu*) with ginger powder, long and black pepper in a goatskin bag for eight hours to remove the ‘oxide’ or ‘tarnish’ (*g.ya*). Then mercury is boiled for several hours in various types of animal urine, washed frequently with water, then boiled for several hours with *tarbu*, and again rinsed many times with water. This process is meant to cleanse the mercury from oxides and adulterants. Then, mustard oil is heated in an iron pan and mercury is boiled in this oil together with very thin sheets of ‘tin’ (*gsha’ dkar*) for several hours. Finally the mixture is triturated in a stone mortar with pre-processed yellow ‘sulphur’ or *muzi* (*mu zi*) into a fine powder of a blackish deep blue colour until no silvery brightness remains.

(Gerke 2013, p. 123)

This coming-together of materials and practises clearly shows how human crafters ‘take over from where non-humans have left off’ (Ingold 2011, p. 24), how metals, minerals, plants, and animals are sourced for their properties, combined in highly original ways, and consequently transformed into *something* new, which is ever impermanent and thus alive.

In her ‘ethnography of the factory floor’, Sienna Craig (2011, 2012) on the other hand emphasises how a drive towards Good Manufacturing Practice (GMP) implementation in Tibetan medicine factories in Tibet, brought about a fetishisation of hygiene, recasting medicinal flower gardens and holy spring water as possible contaminants. In this new regime of pharmaceutical governance, human-nonhuman interactions changed drastically:

Before increasing mechanization and now the GMP era, those assisting with medicine production had a strong sensory relationship with the plants, minerals, and animal products. Making medicines required physical strength and drew from local populations. In the highly mechanized era of GMP-certified factories, employees are physically separated from *materia medica* through ritualized acts of donning disposable scrubs, masks, and plastic gloves. While this keeps things ‘clean’ – and is even lauded as a positive change by many in the industry as

standards to which other small-scale producers should aspire – it also changes the embodied nature of producing Tibetan medicine. This is not to say that factories are inimical places, but rather that spaces and times for social interaction have become distinct from those devoted to labor. In Marxian terms, this shift corresponds with a transition from conceiving of Tibetan medicines primarily for their *use value*, their direct utility, to seeing them as items that embody specific *exchange values*, linked with market prices and emblematic of processes of standardization and commodification. (Craig 2012, p. 162)

In this context, Martin Saxer (2013) adds that GMP has come to stand for the entire industrialisation of Tibetan medicine, creating a chimera of seemingly incompatible knowledge systems and best practices. He summarises the general steps of production for Tibetan *rilbu* pills (the most commonly used dosage form, made by adding water to a powdered mixture) in these GMP plants: sourcing of raw materials, storage, pre-processing (simple cleaning and sorting, or complex detoxification), mechanical grinding, mixing, rolling the mixture into pills, microwave sterilisation (never carried out, even if the ovens are there), electrical drying, packaging and labelling. Based on a comparison of the traditional ideals represented by *The seven limbs (yenlak dün)* section of *the Four Tantras* with GMP regulations, and with how these pills are actually manufactured, Saxer argues that conflicts in practice are not caused by incommensurable rationales<sup>48</sup>, but rather stem from the side effects of the rapidly enforced and untested implementation of GMP in the planning and construction surge towards new, compliant factories between 2002 and 2004. According to the same author, the shift to mechanical grinding constitutes the biggest diversion from archetypical manual medicine making (with a stone mortar and pestle), saving the producer a lot of time and physical effort. Even though machinery – on which Saxer focused, revealing their hybrid nature – was already introduced decades before the introduction of GMP, the newer and faster grinding mills raised further concerns among some practitioners, notably about their material influences on the medicines in the making. The second-generation mills greatly reduce the amount of noise and dust as well as the

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<sup>48</sup> There is, however, a recurring and more fundamental conflict between universal, abstract knowledge and rules (the *techné* or *epistémè* in Foucaultian terms, promulgated by modernist states and market forces) and pluralistic, contextual, and practical knowledge (*mētis*) both within and between Sowa Rigpa and cosmopolitan technoscience (see Blaikie (2014), Craig (2011) and Saxer (2013) for detailed discussions).



need for sieving – thus improving working conditions – but this increase in efficiency and speed came at the cost of more heat production (through friction of the steel machine blades with the ingredients).<sup>49</sup> Moreover, iron and by extension stainless steel, as some would argue, negatively affects the potency of (precious) pills, leading several manufacturers in China to look for alternatives such as mechanised marble pestles. This mechanisation of the production process at Tibetan medicine factories in the Tibetan areas under China is paralleled in observations of the Indian Ayurvedic and Unani industries, revealing the hegemony of modern science and technology in tandem with a capitalist market logic. Banerjee (2009) for instance details how at Dabur, the largest Ayurvedic pharmaceutical company, chemists and engineers were involved in translating the labour-intensive and time-consuming processing of a herbal mixture in a buried earthen pot sealed with clay into machine-assisted temperature control. Bode (2008) also visited ultra-modern manufacturing units in India run by engineers trained at biomedical factories, where ‘no hands touch the products until the machine-packed medicines are collected by personnel and put on large pallets’ (Bode 2008, p. 134), adding that the lack of artisanal skill is what makes traditionalists doubt the quality and efficacy of these medicines.

Calum Blaikie’s doctoral dissertation (2014) has delivered the most fine-grained ethnographic account of Tibetan medicine-making to date, focusing on small-scale producers and the emerging cottage industry in Ladakh, Himalayan India. Blaikie equally considers the sequence of production stages and reveals the unpredictable and ambivalent influences of commercialisation and standardisation. He consistently stresses the variability, adaptability and resilience of small-scale pharmacy practices and how this is expressed in the medicines themselves, doing justice to the inherent multidimensionality *amchi men* by acknowledging how the social and the technical are intrinsically intertwined:

[e]ach medicine can be seen as a unique assemblage of heterogeneous components, including raw materials gathered in person or obtained through vast networks, which are

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<sup>49</sup> Men-Tsee-Khang still operates what Saxer (2013) calls first-generation grinding equipment. I became painfully aware of the dust and especially very loud noise generated by these mills during my time there, and was eventually able to arrange five safety ear protection headphones for the pharmacy workers at the request of Dr Penpa, who was not able to buy them in Delhi. They were kindly purchased and sent by PADMA as a donation.

transformed through abstract/theoretical and technical/applied knowledge gleaned from diverse sources, applied and adapted through ongoing praxis. (Blaikie 2014, p. 263)

Since *menjor* practices are not explained in detail at all in classical texts or most handbooks, learning these procedures requires extensive practical instruction and experimentation along the lines of Ingold's (2000) concepts of the taskscape and enskilment. In practice, the classical, 'ideal' formulae are nearly always altered in accordance with local material, environmental, economic, and empirical circumstances, as part of what Blaikie (2013) calls 'currents of tradition in Sowa Rigpa pharmacy'. Coming back to grinding machines, Blaikie (2014) adds that it is not necessarily the equipment itself that is questioned by *amchi*, but the ability and diligence of its operators. Nevertheless, the voiced concerns here echo those of Tibetan practitioners, namely the metal and the heat as well as the electrical currents running through the machines.

Theresia Hofer also explores 'the art of compounding' at Tashilunpo Monastery clinic (Tibetan Autonomous Region, China) and describes it briefly using the example of a 25-ingredient medicine named 'Vermillion Voice', a pill frequently prescribed for rheumatic disorders:

After the ingredients have been cleaned and prepared to Lozang Tashi's [pseudonym for the monk-physician who oversees the production unit] satisfaction by the staff [who according to Hofer "have little or no knowledge of the overall process of medicine production" (p. 57)], he individually weighs them on a hand scale and places most in a large metal container. A small number of ingredients are kept apart to be ground separately. This initial preparation of twenty-two of the ingredients is the outcome of three solid afternoons of work. In the next step the ingredients are mixed and then fed in small quantities into a machine for pulverization. The machine is turned off at intervals, to let it cool down. In the preparation of Trinsel 25 its cooling properties should be enhanced. The three harder ingredients that had been put aside are subsequently ground on their own, mixed in with those that had been pulverized, and left to cool. The following day, the powder is placed in a rotating machine. Round-shaped pills are formed by dropping water into the powdered ingredients. In some cases pills are also given a final shaping by hand before being dried in direct sunlight on the roof of the clinic or inside in the shade. (Hofer 2014b, p. 58)

Hofer contrasts this with what she learned during a visit to PADMA, where she interviewed and toured the company with Herbert, I imagine in much the same way I did at the start of my fieldwork there. However, in comparing these two very different lifeworlds directly, she risks aligning their differences along simplistic traditional/modern binaries. First of all, she invokes *The Seven Limbs* to describe the manufacturing unit at the monastery, while discussing GMP in relation to PADMA. But people in both contexts are aware of *Seven limbs* and GMP, and there is not necessarily a clash between them in practice as shown by Saxer (2013). Secondly, her use of contrastive language: the 'tiny' unit that is part of a 'pleasant monastic courtyard' versus PADMA's 'large factory hall'. PADMA is in fact tiny compared to the Chinese Tibetan medicine industry or to Big Pharma (cf. Chapter 6). Thirdly, the focus on embodied skills versus state-of-the-art machinery, a split I critique in this chapter. Hofer refers to PADMA's mixing device as an example of such technology, but it is actually a basic piece of equipment in use in the food industry for over half a century. Finally, her inaccurate statement that '[a]ssessment of morphology and taste are almost nonexistent there [at PADMA]' (p. 63, see sections 1.4.2, 3.3.1 and Chapter 4). The comparison to '[a] Tibetan medical doctor [who] would judge the subtle differences of each batch, its hotness, bitterness, or astringency, in relation to its region of origin, and would then make adjustments accordingly' (ibid.) seems unfair because of the dissimilar economies of scale Hofer herself refers to. In what follows, I will not focus on these habitus-specific differences, instead highlighting aspects that are fundamentally shared: the dealings with medicinal materials through various technologies and enskilled practices, and how these interact with each other to become transformed into medicine.

### 3.3 'Production is messy': A typical atypical day on PADMA's factory floor, analysed through the voice of Herbert

I think it's clear production is a hectic process if it is going on. You have to step out of the way. If it runs it runs. When it slows down there may be some time for discussion. Otherwise we have to stop this [i.e. my interferences]. We have enough to do; we are very limited in different things. (Herbert, 9 December 2013, Audio recording 35)

Two days after Herbert's caveat (Diary 11 December 2013, Notebook IV), I had to get up early to reach PADMA before production commenced. I was excited: it was the first time I would witness the manufacturing process in person. It was still dark. The air was cold and crisp. It had snowed that night. When I arrived at the car park, Rolf – PADMA's head of production who I had been introduced to the day before – had just got out of his car. We entered the building together. As requested, I had brought a second pair of shoes. These were disinfected with an ethanol spray so that there was no need to don a pair of shoe protectors every time I enter the restricted 'White Zone' where the actual transformation takes place from powdered ingredient to filled capsules in blisters. Inside the men's changing room, Rolf instructed me to put on a hair and beard mask and a white overcoat. The zipper should be closed up to the neck. I also disinfected my hands. We crossed the black-white divide in the wardrobe, and finally opened the door that led inside the White Zone. Rolf gave me a short tour of the different rooms and compartments, and explained what was going to happen today. Signposts near the doors indicated the stages of production that take place there: *dosieren* (dosing), *mischen* (mixing), *sieben* (sieving), *kapseln* (encapsulation), *blistern* (blistering), *verpacken* (packaging), and so on. He explained that if I wanted to change workplace from the mixing and sieving rooms to blistering, I would have to put on a new set of protective clothing to prevent cross-contamination. Dosing and mixing produce more dust (Audio recording 39).<sup>50</sup>

### 3.3.1 Dosing, mixing and sieving

'Careful.' On my right side, an automated compartment door swiftly swept down, shutting us off from the White Zone entrance hall. Rolf summarised the dosing procedure for me, which I observed for several hours later that day. What in a first approximation seems like a very simple process – weighing the necessary amounts of raw materials needed and loading these into the mixing device – requires a series of steps that have to be carried out with pharmaceutical precision and documented in protocols. Each bag with herbal powdered material is weighed three times (incoming weight, weight of the powder in the

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<sup>50</sup> Ordinary 'dust' is a vague term for what is actually the aerosol fraction of the powdered raw materials, released during various production stages.

dosing container, and outgoing weight), using two different scales, and the amount has to be read aloud and confirmed each time by both the control person and the dosing person in accordance with the four-eye principle. The control person has to compare the colour and smell of the pulverised herbs in each bag with a reference sample, even though samples of the same batch (not necessarily the same bag) have already received the green light from the quality control lab. 'It is a horizontal forced mixing machine', Rolf continues. 'The total volume is 3200 litres; the usable volume is 2500 litres. Power consumption is like a normal Volkswagen Golf; around one hundred KW. There are also two cutters which are helping to get in a more or less short time a homogenous mixture.' Rolf effortlessly discussed all its details. He was schooled as a car mechanic forty years ago, and after thirty years running all stages of production he applied these skills as a manager. 'Around 890 kilograms will be produced, which is about two million capsules. The amount of boxes depends on the size of the boxes – there are different sizes.' He added that today twenty-two raw materials will be mixed, plus two components (*Hilfstoffe*, excipients) that increase the ductility of the mixture. The recipe is a variant of PADMA 28 internally labelled 'Preparation 015', adapted for the Danish market. Meanwhile, the production workers had arrived on-site and had started the necessary daily control of the machinery, environment and initial documentation. Just outside the mixing room, the sacks containing the powdered ingredients were ready, lined in neat rows in white plastic containers. Mevlan and Liman were wearing blue overalls and safety footwear in addition to the hairnets, and – depending on the procedure and their role in it – they donned powder-free latex gloves, and facial protection masks. Both of these men are in their forties, and naturalised Swiss citizens of South-eastern European origins. They know each other well, have been working at PADMA for years, and occasionally switch from Swiss German (*Schwyzerdütsch*, often described as an Allemanic 'dialect' and at times unexpectedly close to my native Flemish-Dutch) to Macedonian.

Surprised and caught by the sound of the action, I watched how Liman used a rather large blunt hammer to repeatedly hit a bag of pulverised *Phyllanthus emblicae Fructus* – the fruit of emblic myrobalan, one of the well-known Tibetan 'Three Fruits' (*drébu sum*) – before pouring its contents into the dosing container. Rolf smiled, noticing my puzzled facial

expression, and explained that during storage the bags are compressed from the weight above, and that this compaction *sometimes* leads to hard blocks forming in the case of *certain* herbs. A grid covers the opening to the mixing container for safety reasons, making it impossible to fill it with larger chunks of material. Liman had to use quite a lot of force to break up the solid mass. He also crushed the large blocks in the container with a stainless steel shovel. Rolf ensured me that this is all part of normal procedure. He left and I carried on observing, continuously shifting places in the dosing room in a half-baked effort not to block or disrupt the process. Mevlan brought in the bags while Liman emptied them inside the container and then transported and lifted it onto the mixing machine with a small forklift truck, to empty it. Again, the descriptive and mechanical nature of this sentence conceals the practices that only emerge clearly in moments of contingency: the skills, effort and sweat of brute force in lifting and hammering heavy bags immediately followed by pouring a precise amount into the container, at the same time paying attention to general and health and safety operating procedures, carefully documenting nearly every move in this rather disagreeable environment consisting of artificial light, machine buzzing, cool and dry (humidity-controlled) air flows, and disinfected surfaces. This physical interaction between the workers, the ingredients and the machines is not always predictable, and may require mediation by means of simple tools such as hammer and shovel to force the materials into the production line again.



**Figure 3.1.** Mevlan watched from the forklift truck as Liman opened the shaft of the dosing container to release the powdered mixture into the mixing machine. A proportion of the material in the form of hard chunks (of powdered *Phyllanthus emblica* fruits) was temporarily blocked by a grid covering the mixer.

Mevlan was using the forklift truck to move and lift the container now filled with powder onto the mixing machine. Liman carefully opened the shaft to let the powder flow into the mixer: '*Scheisse!*', he repeated mutely in several languages. The materials were not moving through the grid smoothly. He opened and closed the shaft a few times, and then decided to hit the container lightly on the side with a rubber hammer. It did not help much. The emblic myrobalan was the problem again, the hard chunks he had tried to pierce earlier were still too big. Liman tried hitting harder. They lifted the container back down to the floor and used a disinfected stainless steel rod to pierce the blocks in the container. Mevlan

grimaced, pointing out how he was sweating because of all this action. After almost half an hour, the problem was solved. But time was lost and the mixing could now not be finished before noon. It was striking to see all these simple tools being used, which were not mentioned explicitly in the procedures but were designated for use inside the White Zone. Two days later, I discussed this with Herbert (Audio recording 47), wondering if these tools are also validated before use similar to other production machines and processes. His response evoked the underlying paradigm of risk analysis (see Chapter 4) and the need to weed out contingencies and integrate them in improved protocols.

No, of course not, but you are allowed to improvise. The idea with the hammer is intelligent, but at the same time, if you [as a production worker] report this happened and if this is very often the case with this *Phyllanthus*, then the idea is not to keep using the hammer all the time but to devise a process so that the hammer is not needed [anymore]. When first encountering a problem, you have to do something. The worst case is to stop everything. But if the second and third time you always use the hammer... ok, maybe something [in the process] is wrong. Therefore, we need feedback [from inside production].

After a quick lunch with Mevlan and Liman at a Turkish kebab place close by in Kempten town, we continued the dosing. It was the turn for *Myrobalani Fructus* to be dosed into a second container, which Mevlan introduced as the king of Tibetan medicines. Three more ingredients, then another mixing cycle of twenty-four minutes, then the *Hilfstoffe* (excipients) needed to be added, and *fertig!* During the sieving process, which took place in a smaller adjacent room with the help of rapid machine-powered vibration, the fresh odour of herbs became ever more poignant. The sieved final mixture (*Fertigmischung*) was then transferred and sealed into six shiny metal drums and weighed one more time. Mevlan finished the admin. I watched Liman washing his face at the sink, coughing and spitting, his clothing full of dust. Even with all the precautions and protections, it was impossible not to get the fine herbal dust everywhere. Walking back to the train station, I still had the smell of herbs in my nose, and it never left my notebook.



### 3.3.2 Encapsulation

The next day, I observed the encapsulation process (Notebook V, Diary 12 December 2013). It was 7:20 AM, Pema was the first staff member to arrive. The offices were still closed. Five minutes later Mevlan arrived and suited up. He invited me to come and join him in production. We were both wearing ear protectors to muffle the loud buzz that filled the room as he started up the encapsulation machine, to enclose the finished mixture of 'Preparation 017' into gelatine caps. Mevlan needed to check everything before the production line is cleared (*Linienfreigabe*). He calibrated the balances, and completed the room, machine and balance logbooks. The machinery is comprised of three main units: a filling and closing part, a weighing unit, and the metal detector. The central unit of the machine itself consists of two partially overlapping, revolving cylinders: the lower one receives the product in the body of the capsule, and the upper puts on the cap. Mevlan first conducted a test of the built-in metal detector by inserting tiny test particles in the machine to verify if these are detected and sorted out. He introduced me to the machine software. Every single capsule is weighed separately at a speed of three milliseconds per cap, with a precision of one milligram, and for each hundred pills this is visualised as a data point on one of the graphs indicating machine performance, accessible via a large touchscreen. Capsule-filling started a little below the ideal weight, so the filling pressure was automatically increased slightly. Supply of the powder is automated, but a worker still has to change the bags in which the filled capsules are collected every now and then. This process can also be mechanised, but PADMA did not opt for it. There is not enough space in the current room, Mevlan noted. He also had to perform two sets of in-process controls (IPCs) per day: to read off the weight of a certain number of capsules from another balance, and to verify that the capsules are the correct size, using a special tool in which the capsule should fit perfectly, to see if they close well. 'But you can already see this there [on the encapsulation machine screen]', he added dryly.



**Figure 3.2.** Mevlan is starting up the encapsulation machine to process today's batch of Preparation 017, which is the PADMA 28 formula for the Swiss market, also marketed as PADMED Circosan.

Mevlan had only just left the room for a few seconds, when the machine stopped and several error messages flashed up on the touchscreen in red. Mevlan returned – he had most likely heard the absence of the machine buzzing – and checked the screen. He sighed, *„Die Maschine ist high tech, die beste heute, aber ohne den Menschen funktioniert es nicht“*: although this machine is top-notch equipment, it cannot operate without human intervention and support. I noticed how before handling the inside of the machine, he sprayed his gloves with disinfectant, swiftly, almost without looking at his hands. He removed two capsules that got stuck and were crushed together. This part of the machine alone had cost 40,000 Swiss francs (40,887 USD), he cautioned. He applied pressurised air to blow away the spilled capsule contents, and used a wrench to readjust the different machine parts to each other again. Mevlan told me he has been working here for seventeen years now and that he *knows* all the machines. He can take them apart completely and put them back together, if necessary. He saves PADMA a lot of money by preventing and solving

these problems efficiently: losing two hundred capsules – let alone precious production time – equals a loss of about thirty Swiss Francs (30.67 USD, the wholesaler price). The work plan stated two million capsules have to be filled in two days, but this is only possible if the machine works continuously: ‘*Du kannst nicht mit zwei Löffel essen*’, you can’t do two things at the same time.

Rolf, in a later conversation with me on machine operation and maintenance (Audio recording 68), reinforced Mevlan’s statements on the novelty, high speed and complexity of the encapsulation equipment. He added that the machine is still relatively new to PADMA since they only started to work with it in September 2010. It has been running continuously for only about 1,300 hours in the last three years.

We are not only learning more, but also gaining experience [he used the word *Erfahrung*]: how long the tools last, how the parts in it work together with our formulations, and so on. We also have knowledge from the past. [...] I think this quite big complexity makes it also... As you know from using computers: sometimes they work (laughing)! We have to learn, and gain experience.

He explained that they used to produce all formulas in tablet form, and that the steel stamps that pressed the powder together only had a life expectancy of 3-5 million tablets due to the abrasive properties of the herbal mixture. A similar process might be happening inside the capsule machinery, as was also hypothesised by a Bosch engineer who came to fix the machine later on. Here, the herbal materiality of the active ingredient does come to the fore.

### 3.3.3 Blistering

I headed over to the blistering and packaging unit. A sheet on the door indicated what was being processed: ‘PADMA Digestin, Charge Nr. 801.00505’. A minor fault had just been identified, and the blister machine was temporarily stopped. Once more, a skilled intervention was vital to redirect the material agency of the worker-machine-pill assemblage. Pema Lhaning is a Tibetan who has been working for PADMA for more than two decades. He is a machine operative (*Maschinenführer*), implying he has to be present

to oversee the functioning of this machine. Pema used his bare (disinfected) hands and some tools to tweak the section of the machine that was supposed to seal the translucent gelatine capsules in a plastic well covered by aluminium foil (Figure 3.3). Pema's intervention did not succeed in entirely eliminating a very infrequent, small deformation in the separation of two capsules on the blisters. This meant the packagers had to temporarily perform a 100% visual control of each blister. Three other workers were involved with the machine in this room: in getting the blisters from the assembly line into packages together with the leaflet, and putting these into larger boxes.

Jan: What was the problem?

Pema: The temperature. When it [the blistering machine] stops, it gets too hot ... Then we have difficulties ... Here is too soft ... This is what we call the sealing position ... (Loud pumping, cutting and buzzing sounds overrule our conversation, a radio is also playing in the background)

Jan: How many pills can you process in one hour?

Pema: It depends. Maybe a hundred blisters in one minute.

Jan: You cannot make it faster?

Pema: I can make it faster, but then I have to heat more, regulate the temperature. If the heat is too low the naps will not be closed. All things are connected, you know.<sup>51</sup> Sometimes I have to change it, I have to document exactly what I do. I alone cannot do it. The temperature has a minimum and maximum.

Jan: Can there sometimes be a mistake, one capsule missing?

Pema: The machine also knows. It [the blister with the flaw] will be dropped. We can check it. See. (He teases out one capsule from the input stream, and we watch how the blister with an empty space is separated out.)

Jan: You sometimes use the microscope over there?

Pema: I have to make in-process control every hour. I have to look at the batch number, and formation, that's all. The batch information has to be readable. Then sealing,

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<sup>51</sup> From the way he said this it was obvious that I was talking to a fellow Buddhist, who was referring to the fundamental concept of 'dependent arising' (Tib. *tendrel*), the composite, interdependent nature of all phenomena.

every capsule must be sealed. If two together, no seal, is no good.

(Audio recording 40)



**Figure 3.3.** Pema manually tweaked the position of the sealing compartment, which applies heat and pressure to cover and seal the filled plastic pockets with aluminium foil. In subsequent steps, the batch number and expiry date is impressed, the blister packs (containing twenty capsules each) are cut out, and then slide down steadily towards the packaging workers. His intervention was called for in this instance because two blister pockets were not being perfectly separated from each other in a small minority of blisters.

### 3.3.4 Packaging

The 9 AM break. Overall, the atmosphere was friendly but stern. Everyone had been working hard and was on a tight schedule; a cup of tea or coffee with a biscuit helped. Some

teasing and joking during the break relieved some tension. Several staff laughingly said how it seemed that I was writing a novel, noting the most insignificant details – which I did – as some kind of spy or detective would, such as ‘Liman has a dentist appointment on Friday’. Pema reported that the imperfect sealing issue was still there. A mechanic (*Monteur*) of the blistering machine company will have to come to fix it. Alexandra, the wife of Herbert and also part of the company management team, wanted to know why the dosing yesterday went slower than expected. Mevlan replied that *Phyllanthus* and *T. bellerica* were rock hard. Alexandra contended that they should have noticed this in advance and asked for help. The interface of capitalism and pharmaceutical regulation, where time is (a lot of) money and where the show must go on as part of an ever-evolving GMP performance, is reflected in a somewhat tense working environment: the content, pragmatism and punctuality of meetings (the famous German and in this case Swiss *Pünktlichkeit*, typified by their high-end watchmaking industry), the looming presence of multiple deadlines, and in the weekly production schedules where each employee’s worktime is allocated to the minute. On top of the many seemingly futile in-process controls and the high administrative burden, the sequential nature of the assembly line entails that one significant mistake in bringing all the required materials and paperwork together can shut down the entire machinery.

Besides this ‘normal’ situation, production was particularly stressful at this time – as Herbert had told me earlier on – due to changes in staff composition, quality assurance, and the impending purchase of a new packaging line. This new machinery – an investment of roughly 1.5 million Swiss francs (about the same number in USD) – was set to replace the current blistering machine. The latter had been in use for more than twenty-three years and was failing because of old age and the increasing unavailability of spare parts and engineers with the necessary machine-specific expertise. From dosing to packaging, the blistering phase followed by manual packaging of the blisters into boxes was the weakest link, blocking faster output through the entire sequence. The new machine will have a cycle of 180 blisters per minute, drastically cutting down on processing time but also on the

amount of workers needed.<sup>52</sup> These decisions do not correlate directly to the herbal and mineral ingredients of PADMA formulas, but they do show how the interplay between components of the ingredient-machine-operator assemblage is forced to change as a consequence of a peculiar combination of technical and economic considerations, repositioning the need for skilled labour from fine human sensorimotor movements to a more peripheral but no less skilled position, to automaton operation and maintenance. When I probed Herbert to comment on this, he replied as follows (Audio recording 50, 30 January 2014):

There are only fifty weeks available in the year. The bottleneck [i.e. the most time-intensive part] is [also, in this case] the most labour-intensive part. The problem is not the number of workers but the time they take. That's in brief the calculation we had. It is not so much about [increasing] demand, but the nervous situation, the tension you feel in production. There is no free time. Because when we lose a day, even in current production, they are thinking when do we fit in the next day, because we are always short on time, because it takes so long. It is not so much an issue of saving time or money. To expand the capacity at the moment, we actually need to reduce the work load. The work balance has to be better. Of course in the end, why not put here [at packaging] ten instead of two or three people. Because when there are ten people, you need an eleventh one to monitor them. Because it's pharmaceutical grade production, you have to train them and maintain the whole cycle. [...] Aaaargh! It's the sociology of the working class kicking in.

This chapter is purposely not a political-economic Marxist sociology of work and industry (Watson 2008) that scrutinizes the unequal relations and contradictions between capitalist surplus value extractors and alienated, exploited proletarian workers. Braverman's (1974) early formative study of 'the labour process' however and his thesis that the mechanisation of jobs instigated by human relations experts and managers leads to the deskilling and degradation of employees deserves to be mentioned here. Instead of simplistically portraying managers (such as Herbert and Rolf in this chapter) as an omniscient united block and problematically romanticising the skill of craft workers, I observed an at least partial alignment of employer-worker interests in a workplace based on continual skill

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<sup>52</sup> When the new blistering machine was first put into operation, Herbert told me that Mevlan and Pema had difficulties working through the thick German technical manual (Field Notes XI). This is indeed not how they would usually learn, solve problems and engage with the machines in practice.

upgrading and tweaking through in-house training and inspection to keep up with the GMP rat race of evermore stringent pharmaceutical regulation. Even if in PADMA the distinction between the stereotypical blue- and white-collar worker is blurred, and even if this still ultimately serves capitalist interests, managers and employers are equally caught up in it. Notwithstanding the many forms of control in pharmaceutical production (formalised under quality control, assurance and risk management, see Chapter 4), I show that workers enjoy considerable ‘responsible autonomy’ (cf. Friedman 1977) within PADMA’s shallow hierarchy and the paradoxes of instrumentalist-rationalist bureaucracy.



**Figure 3.4. Manual packaging of Arteria-vita, a product of the PADMA 28 family (with identical ingredients to both Swiss PADMA 28 and PADMED Circosan) that is marketed specifically to Swiss doctors by the independent company Permamed AG. The blisters were taken from the blistering machine (left) and put into the boxes together with the package leaflet by hand before the new packaging line was installed in early 2015.**



After a first intensive week of following production processes, Herbert invited me for a drink at a hotel in Zürich. Over dinner, I enthusiastically related my experiences to him together with a series of questions arising from it. In response to my amazement concerning the frequency of 'unexpected problems' I encountered at several manufacturing stages, he replied as follows:

Always something happens like this, as the demand [of pharmaceutical, GMP-certified production on workers and machines] is high. It is also some kind of error correction. The worst thing is if some external source points to a mistake. If they report directly to PADMA that is also good. But if it comes back by the official route, such a mistake triggers extra inspection. This is what we try to avoid. It is part of risk management. I think this is also reflected somehow in the informal way in which production is planned, in a self-organising manner. It has its schedule, the week plan, but this only solidifies as time progresses. We have this rolling planning. We want to [be able to] react on the circumstances. It is not a big thing. But there is not so much... How to say. Tibetan medicine as such is easy on the production level. The miracle or problem lies not at this level in our country, this 'transformation' or whatever you are looking for. The mysterious thing for our people is the regulatory, it is in the paper. You've got the problem of the blister machine, it was broken, we need to find a guy to fix it. Then the machine on the roof has a problem, the climate control. Because of this machine, the computer responsible for it... There is nobody coming with a big wrench fixing the problem. It is always connected with who is allowed to do it [a certified company engineer], whom can we call, who has the right permit. You cannot climb up on the roof and start... This is one of the differences to a situation in India where you are still more directly connected with the basics. (Audio recording 47)

Notwithstanding Herbert's repeated statement that it's all about paper and regulations (an assertion which I take seriously in Chapter 6), in the previous sections I showed how the circumstantial nature of manufacturing medicines cannot be reduced to a mere reading or mechanical execution of standard operating procedures and protocols,<sup>53</sup> a fact which PADMA employees are well aware of. This is indeed not just a story about the transformation of herbs, but a narrative of becoming together with skilled workers and

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<sup>53</sup> Experimental laboratory protocols have been described through new sociology of science approaches as a literary technology that aims to turn the reader into a virtual witness in order to make reproducibility possible (Shapin and Shaffer 1985). Nevertheless, these procedures often fall short of transferring the tacit knowledge and skills needed to perform the task at hand (Collins 1974, Polanyi 1966).

sensitive machines in a responsive, fluctuating environment of substances, surfaces and media. In the next section, I delve into one more example of how a PADMA staff member employed uniquely honed skills to overcome plant-machine incompatibility, by sensing and attuning the composition of a formula to the encapsulation machine.

### 3.4 *Rezeptentwicklung*: sensing material properties and knowing machines

intimately

I observed another morning of dosing and mixing with Mevlan and Liman (14 February 2014, Notebook VI), but this time the event took place in a smaller place adjacent to the usual room because a different mixing installation is used to homogenise small batches. When I arrived around 7:30, they were already preparing the room: taking out unnecessary objects to create more space, filling in the mixer logbook, checking the balances and sieves, bringing the ingredients, and so on. They had to follow and fill in the protocol *Herstellung Fertigmischung Präparat 179*. Everything goes smoothly this time. Even though the myrobalan powder had cemented into hard clumps, this was not a problem with this model of mixer, which was not covered by a grid. Mevlan was routinely checking the colour and smell of each bag of powder with reference samples. He told me he has known myrobalan for a long time now. Sometimes the powder is a bit lighter or darker. Depending on the harvesting and drying, the fruits can be more greenish or brownish. At one instance, he spotted a conspicuous colour difference between the sample and the respective reference powder. Upon cross-checking, it turned out Liman had accidentally provided the wrong sack. The check worked flawlessly. After the mixing was finished (twelve minutes with chopping blades), Mevlan phoned Rolf to come over and check the consistency of the final mixture in order to find out if excipients would be needed for encapsulation. This batch was an eighty-kilogram test mixture to develop Swiss PADMA LAX (previously in tablets) into capsule form.<sup>54</sup> This change required a reformulation with regard to the excipients to be added.

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<sup>54</sup> PADMA LAX was the first formula to be registered historically by the company (in 1972, Swissmedic Nr. 35872). Its current indications are for temporary constipation, the stimulation of digestive function, and to reduce flatulence (cf. English translation of Swiss-German package insert for patients, PADMA website).

Rolf arrives, wearing a full set of overclothing. After meticulously washing his hands, he dons a pair of white latex gloves, pulling them up over his sleeves. Standing on a small ladder to be able to reach inside the filled mixer, he carefully wades through the mixed powder using one hand. For about two minutes there is complete silence while he stirs, kneads, and watches the yellow-greenish powder aggregate and flow through his fingers. 'We will try without *Hilfstoffe*, but will first test a small amount on the [encapsulation] machine', he decided. I was baffled by Rolf's display of a manual, sensorial skill in this pharmaceutical environment that cannot be learned from books or pharma trainings, which he himself developed experientially to be able to gauge and react to incompatibilities between the plant and machine worlds through the circumstantial use of excipients. A few days later I asked him why this was necessary.

If you are producing capsules, you need only to bring the mixture in a cylindrical form, to fill this cylinder in the capsule body. For that mostly you need less ingredients. Less *Hilfstoffe*. But to produce the capsules, or this cylinder, the mixture needs to have flowability [*Fließfähigkeit*] in a certain range. During the production process, when the cylinder is formed in the capsule machine, there are five stations in which layers of mixture will be built on [top of] each other. In the first station there is a lower [volume], in second more mixture will fall into the holes of the *Dosierscheibe*, the round dosing plate. [The contents] will [then] be pressed a little bit. So you fill and build this cylinder. [...] To hold the mixture together we do not need ingredients, the capsule shell holds it. [...] Now for PADMA LAX I [may] need Boson® as a lubricant, to bring the formed cylinder out of the holes [of the dosing plate]. It blocks without Boson. (Audio recording 68, 20 February 2014)

This explanation of the 'why', couched in 'objective' rational scientific language, seems far removed from the 'how', the actual skilled practice of sensing the material properties of these phyto-mineralogical mixtures. Rolf mentioned that in principle there are several formal tests available that one could carry out to determine the need for excipients, for instance using a specific cone to measure fluidity. Nonetheless, he asserts that this is not the same and is less reliable than feeling for oneself (*spüren*), touching (*anfassen*) the material and compressing it (*zusammendrücken*), seeing how it flows or sticks together. Even if he cannot feel the exact quantity of excipient needed, he can get an impression and based on that attempt a certain combination, which may or may not turn out to work. Another option is to adjust the dosing plate of the encapsulation machine to the mixture,

but the outcome always remains uncertain until tried out. Once the proper (proportion of) excipients has been empirically obtained, the formula has been fully developed. Only then can the composition of the ingredients be standardised for future reference. This minor adjustment or adaptation of the 'original' formula to local environmental – and in this case technical – circumstances further increases the variability of Tibetan medical recipes, while moving away from the often untenable and static, classical ideals of *menjor* in Sowa Rigpa, as argued by Blaikie (2014, 2015). The addition of excipients described here equally requires 'carefully considered recalibrations [that] are the result of comparison between the prevalent environmental and elemental conditions and the projected conditions under which the formulae were first invented and popularized' (Blaikie 2014, p. 282). Similarly, it also requires sound knowledge of the various ingredients as well as the confidence to act, while attesting to the now well-known flexibility and multiplicity of Tibetan pharmacy (Adams et al. 2011a, Blaikie 2014; Craig 2012, Saxer 2013). As such, these findings substantially soften the categorical distinction between 'classical' and 'industrial' reformulation, as maintained by Pordié and Hardon (2015) in their introduction to a recent journal special issue on the social and material lives of Asian industrial medicines.

### 3.5 Machinofacture brought to life, or Vajrayana and the art of pharmaceutical machine maintenance

Each machine has its own, unique personality which probably could be defined as the intuitive sum total of everything you know and feel about it. This personality constantly changes, usually for the worse, but sometimes surprisingly for the better, and it is this personality that is the real object of motorcycle maintenance. The new ones start out as good-looking strangers and, depending on how they are treated, degenerate rapidly into bad-acting grouches or even cripples, or else turn into healthy, good-natured, long-lasting friends. (Robert M. Pirsig's *Zen and the Art of Motorcycle Maintenance*, p. 50)

The material nature of medicines should not be taken for granted. *Materia medica* are things-in-motion of which the properties are not only used therapeutically but also play a constitutive role in the process of making them. This is pre-eminently true for so-called

'natural' multi-compound Tibetan medicines that are a fusion of many lines of becoming with machines operated by uniquely enskilled workers, who I argue could equally be called 'pharmaceutical artisans'. Even at the industrial mass-production site of PADMA, where plant-machine-operative interactions are entangled in a strictly controlled yet complex material meshwork, there is considerable space for contingency, creativity, and skilled interventions beyond what is mechanistically described in GMP procedures and protocols. Machines perform a central role here, transforming ingredients into a medical product whilst facilitating the communication between plants and people. By applying Ingold's notion of craftsmanship and his ecology of materials, it becomes possible to envision production at the nexus of the social, natural, and technical domains whilst avoiding the pitfalls of disconnected and overly theoretical ruminations on materiality and agency. As such, I concur with Ingold (2000) that the modern dichotomy between art and technology is only a superficial one when looked at from the perspective of artisans. However, Ingold singled out industrial production with automatons, machinofacture, as an exception where far-reaching mechanisation underscored by rigid scientific logic dehumanises and thus deskills the entire process except for the engineering part. I have shown that this does not apply at PADMA, where the distinction between machine operators and mechanics is also blurred, and suspect that this argument can be extended to other factories. Making things *with* humans – these machines can still not operate fully independently – is thus equally not just the automated execution of a pre-conceived form. The shape of the final product may be prefigured, but this does not imply that the entire process is similarly set in stone. Coming back to Pordié and Gaudillière (2014a), PADMA's contemporary products may be reinvented (re)formulations relying on mixed medical (and pharmacological!) paradigms. Yet this does not imply that the material, skilful interactions of making 'traditional' formula medicines are completely absent. On closer inspection PADMA's relatively small-scale production retains workshop qualities.

Likewise, machines are things that are in a continuous state of flux. As *anything* else, these machines are alive. They have histories and as such they co-produce products in a co-responsive manner, requiring feedback from their material environment. The plants as well, previously perceptive organisms, are clearly not inert objects during the various phases of

turning them into medicine. As ingredients they remain alive as part of a dynamic, material and interactive lifeworld. On a more abstract level all this may sound strangely familiar to a Buddhist, as was hinted at by Pema, the Tibetan machine operator who pointed out the composite, interconnected, and impermanent nature of all phenomena through the workings of PADMA's blistering machine. This is dependent arising, the notion that "conditioned by" a certain phenomenon a certain other phenomenon comes into being' (Gethin 1998, p. 153). It is a Buddhist understanding of causality in which the interaction of multiple causes – both fixed and undetermined – gives rise to several results in a manner wholly different from Aristotelian monoconsequentialism or Newtonian mechanics. Dependent arising does not only apply to the ignorant mind and the process of (re)birth and death; it describes the very fabric of reality (Gethin 1998, p. 155, interpreting the Abhidharma textual tradition), and its connectedness.

[R]eality is at heart something dynamic, something fluid; however one looks at it, reality is a process; analyse reality down to its smallest possible components or constituents, and what one finds are, not static building blocks, but dynamic processes.

The unlikely conflation of philosophy and human-machine interaction also happens to be the subject of Robert M. Pirsig's celebrated modern classic titled *Zen and the Art of Motorcycle Maintenance* (1999, originally from 1974). Herbert, PADMA's CEO, advised me to read this. For him, machines are also spiritual things that have a certain kind of aura along the lines of the romantic view presented by Pirsig. After witnessing PADMA's production from close by and having discussed this with him at length, Herbert came up with the following statement when I brought up *Motorcycle Maintenance* again.

For me it's also... I can also feel very comfortable in steel work, in an industrial site. Or in the production of PADMA. [...] When you talk to people [about] what is peaceful and beautiful, they always mention idealistic idyllic nature, when there is no machine, only sheep and laughing children. Seventeenth-century painting Arcadian paradise. Of course, it's nice. But what is the aesthetics or the Quality even in technical, or dirty or machine-like things. For me it was always important to understand a machine, when I studied physics. Somebody who is a good worker says 'I know the machine, I can hear the machine' [as Mevlan and Rolf declared, and Pema exemplified]. Those who know listen to it, like when you drive a car. 'Something is

wrong. I have to listen again.' You can even bond with, connect with the machine. I believe those who can do this work better with the machine. Those who don't like it, break it. Those who don't like the machine don't make good products because they break, they stress the machine. Very often those people say they don't like machines because they like natural things, they like Nature. For them, instead of really liking the world, they only like a part of the world. Therefore, I say we have to honour that we can use, are allowed also to use machines. You have to... You don't just have to adapt to the machine, it also has to adapt to us. There has to be a connectedness with the machine, it has to blend in. In my ideal world I would like to have this. But I am realist enough that it is not always nice. (Audio recording 48, 13 January 2014)

Herbert's words summarise some of my own findings but also indicate how people's relationship to technology leads them to make value judgements about what is beautiful and thus good. I can see how this might play against PADMA as a 'good' producer of Tibetan medicine when looked at through the eyes of scholars and practitioners who have a subtle (or not so subtle) aversion to industry and machines in general.<sup>55</sup> They would 'naturally' sympathise more with romantic traditional-classicist ideals of manual, small-scale, and personal medicine making. However important, these idealised text-based prescriptions turn out to be impossible to follow to the letter in today's world (especially in Europe), which does not necessarily imply that contemporary formulations should no longer be regarded as authentic (instantiations of) classical recipes (see Chapter 6). PADMA's medicines and supplements are clearly the product of an intense and ongoing dialogue between Sowa Rigpa and biomedicine, modulated by the capitalist market system and European and national legislations. Nonetheless, at the hands-on material level of production, skill remains vital, even if it is mediated through intricate machinery.

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<sup>55</sup> The history of anti-technological sentiments and the rise of neo-Luddism in today's industrial societies (see Jones 2006) is beyond the scope of my argument, but it is necessary to flag it so as not to forget that relations with machines are not always positive, and may be ambiguous and even exploitative in a Marxist sense.

## 4 'Qualities': a comparative laboratory ontography

In the early 21st century the lab has a special role, as does the factory. For expertise and control of labor are ubiquitous, and everywhere intertwined. The lab and the factory are the functional inverse of each other, each hiding what the other makes explicit, and their combination is a parable for the dynamics of manipulation and control at play throughout social life. Control over the means of knowledge production is implicated in control over the means of material production (and vice versa).

(Doing 2004, p. 319)

Having looked at PADMA's assembly line in the previous chapter through Ingoldian notions of skill, materials, and technology, I now turn towards Latour's ANT legacy to reveal the construction of 'quality' in the scientific quality control laboratories of both PADMA and Men-Tsee-Khang. These places are characterized by lab coats and benches, glasswork, 'Western' technoscientific apparatus, and physico-chemical analytical procedures. Even though manual skill and tacit knowledge may be as important in working with these materials (see for instance Doing 2004), I hold that Ingold's perspective on production as making does not take us very far in providing insight into what lies at the heart of the laboratory: the execution and interpretation of experiments in a specific locale. The subfield of Laboratory Studies, lying at the foundation of STS, was born exactly out of this particular focus. It seeks to unravel the day-to-day practice of scientific knowledge production *in situ*, as a craft. In a review of this field, sociologist Karin Knorr Cetina (1995, see also Doing 2008) foregrounds 'constructionism' – as opposed to the *discovery* of facts – as the major tenet of this field, resulting in an increased popularity of ethnographic fieldwork in STS.<sup>56</sup> She foregrounds some of the central aspects which underlie the notion

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<sup>56</sup> Fischer (2007) similarly lists 'epistemic objects' as one of the four major contributions of ANT and other object-oriented languages to the field. These are 'experimentally produced through testing, and turning unstable experimental systems into at least temporarily stabilized tools. It is a shift from viewing scientific



of the laboratory: the lab acts as an 'ideal' and contained environment that eliminates complexity by localising and restricting natural processes to manageable proportions. This domestication in turn relies on the ability to transform various objects and forces into their 'purified' versions. Scientific discovery and the construction of facts is always localised, unveiling the power of locales and the importance of circumstance as opposed to the standardised and universalist claims of science. As Knorr Cetina (1995, p. 157) puts it, 'laboratory studies investigate how the successful working of a standard procedure is built out of painful processes of adaptation and learning that 'fit' techniques to settings, and scientists to their methods.'

The post-humanist<sup>57</sup> disposition of STS and its insistence on taking non-human actors seriously – particularly in Latour's earlier works (1982, 1987, 1988 [1984]; Latour and Woolgar 1986) – has been instrumental in 'the shift from a representational to a performative idiom for analysing science and technology, and the closely related switch from an interest in epistemology to a concern with understanding how ontologies are shaped in action' (Jensen 2004, p. 232).

Stressing the intertwinement of human and nonhuman actors in science challenges traditional epistemology because activities such as observing or representing are not seen as distinct from intervening or constructing; rather, they are viewed as specific *ways of* intervening and constructing. In this view, epistemology *collapses into* ontology and the sciences are reformulated as practical activities aimed at (re)building the world by adding new elements with new capabilities and new relationships to it. Knowing (and thinking about knowing) are turned into *particular styles and methods* for connecting and cooperating with specific actors (human and otherwise) – thus shaping reality, or *doing* practical ontology. [...] [I]ts focus is on the eventful *reconfiguration* of reality, taking place in laboratories and elsewhere, rather than on the replacement of naturalist *explanations* of science with social or cultural ones. (Jensen 2004, p. 248, emphasis in original)

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objects and cultural forms as things to be discovered, to recognizing that the process of 'discovery' is increasingly one of active production, of reconfiguring our worlds into new formations' (p. 556-557, emphasis in original).

<sup>57</sup> Here, I refer primarily to the dismantling and disembodiment of the liberal 'subject' in our age of cyborgian technology, cybernetics, and informatics (see Hayles 1999).

This assertion brings us directly to the ontological turn and its significance for STS (Woolgar and Lezaun 2013). This turn aims to circumvent epistemology and its representational language, including notions such as ‘worldviews’, ‘perspectives’, ‘knowledge’ and ‘meaning’, to consider the very existence of entities, multiple worlds and world-making. However, STS studies have long since deflated universalist (and especially scientific) conceptions along these lines, pointing to their materialisation and situated use through the lenses of social construction, performativity, co-production and enactment. What does a turn towards ontology add to this, besides a synthesis or intensification of the sensibilities of previous turns within STS? Woolgar and Lezaun (2013) agree with Michael Lynch (2013) in that coming up with an overarching philosophical theory of objects would be detrimental. On the contrary, Lynch contends that:

STS research tends to pluralize, ‘mundanize’, and merge epistemology, ontology, ethics, and aesthetics. By this, I mean that the central concepts become historicized and situated. Instead of construing them as a part of larger, abstract fields, empirical research posits them as discontinuous local epistemologies, petty ontologies, and so forth. Inventorying the furniture of the world and outlining how we may come to know about it are no longer the privileges of philosophical reflection, as epistemology and ontology become embedded in diverse practices in many fields within and beyond the sciences. (Lynch 2013, p. 451)

To avoid the confusion with metaphysics, Lynch suggests the term ‘ontography’ for this deflation to the mundane by means of historical or ethnographic analysis. To make my argument in this chapter I will not question the general nature of ‘reality’ (or the reality of ‘nature’), nor will I focus on detailed descriptions of laboratory practices to prove the social construction of scientific knowledge.

More recently still, sociocultural anthropologists from both Europe and the US have thoroughly scrutinised the theoretical, methodological and political implications of the ontological turn. Vigh and Sausdal (2014) for instance observe a conceptual slippage from ontologising nonhumans, things and concepts – which they consider less problematic – to (groups of) people. Arguing for different worlds or multiple natures comes with a disavowal

of shared humanity, leading to an emphasis on incommensurability, radical essentialism and alterity. This fetishisation of Otherness in turn denies the possibility of the translation, interpretation and communication of ontologies and therefore minimises reflexivity, doubt and ambivalence. In an increasingly connected political world ontological analytical approaches thus run the risk of fuelling difference along racist, colonialist and xenophobic culturalist lines (*vis-à-vis* an overarching Euro-American cosmology), showing the same flaws as reified culture concepts. Bessire and Bond (2014) similarly attack the post-humanist and post-social dissolution of the nature/culture division in the face of a universalising ecological planetary crisis as ironically founded on a radical modern-nonmodern world binary (demonising and blaming a vague conception of ‘the Moderns’, cf. Berliner et al. 2013). In its avoidance of epistemological critique, this speculative futurism consists of a totalising eschatological monism and a privileged ontological status (the anthropologist-diplomat who alone can interpret and shift between ontologies) akin to religious fundamentalism that ignores (shared) real-world contradictions and collisions.

Nevertheless, even though the anthropological study of (the apprehension of) ‘reality’, Heideggerian ‘Being’ or Deleuzian ‘becoming’ has been conceived by some as a French philosophical anthropology or European turn (Descola and Latour, building on Viveiros de Castro (Kelly 2014), Eduardo Kohn (2015) conceives it more broadly and less stereotypically. While staying true to the everyday messiness of and reflexive, immersive engagements with human lives, ontologically attuned ethnographers view human-world interactions as more than language-like, symbolic social (historical, political-economic, etc.) constructs by apprehending nature – in materiality, nonhumans, the body, but also science, medicine and technologies – not only as and through culture. As Kohn points out by referring to Donna Haraway’s oeuvre, anthropologists can combine this commitment with historical and political acuity. This is a far cry from Bessire and Bond’s (2014) ‘ontological fundamentalism’ and politically problematic theoretical presumptions of radical difference. I agree with Kohn, and follow Lynch (2013) in investigating ‘how questions of identity and difference [of ‘object(s)'/concepts] are worked out in specific cases’ (p. 449), ‘*in and through* disputes’ (p. 450) on (objective) scientific knowledge and expertise. I thus recognise the possibility for

hybrid, (partially) shared practical ontologies in particular instances of world-making and -sustaining.

I would like to respond to Lynch's call for ontography by comparing how quality is enacted in and around the laboratories of PADMA and Men-Tsee-Khang by looking out for instances where scientific-industrial-pharmaceutical and Sowa Rigpa ontologies of quality are forced to interact with one another practically, through historical knowledge exchange and in the creative material encounters of quality control tests. In these factories ingredients are compounded into medicines, but before this the ingredients-to-be have to be analysed to ensure they have all the necessary characteristics to be considered medicinal in the first place. The juxtaposition of European pharmaceutical and Tibetan medical ontologies of quality is complicated by the fact that each is based on concepts and categorisations that are not easily reconciled on a metaphysical level at first sight. How could a (stereotypical) traditionally trained *amchi* grapple with pharmacological (i.e. chemical) concepts of purity, contamination, and pesticide residues in ppm (parts per million) without atomic theory and molecules? The same goes for microscopic identification and the cell, and this line of thought can be replicated for other building blocks of the biomedical model. Conversely, can our modern Western minds and bodies truly fathom the universality of the five elements (*jungwa nga*) as the fundamental nature of body, disease and medicine, and how these elements determine the taste of substances, which in turn determines their potency (*nüpa*)? Both PADMA's and Men-Tsee-Khang's quality control processes straddle these seemingly incommensurable worlds, creating hybrid, multiple 'qualities' of Tibetan medical substances in practice. Paradoxically but not unexpectedly, their quality often has to be expressed as quantity in the lab aided by lab technologies. The term quality has taken on multiple specialist, technical connotations in pharmaceutical regulations and industry especially as part of compounds such as quality control, quality assurance, and quality risk management. But what does the adjective 'Tibetan' add to this mix in the contemporary industrial production of 'Tibetan medicines', or differently put, what is special about the quality control of Tibetan medical substances? I seek to illustrate the dynamic and hybrid nature of the ontologies that underly how 'quality' is technically constructed and made measurable, arguing that these engender differing but interconnected 'qualities' at two

similarly equipped laboratories in very different social, economic and political worlds. I thus aim to move beyond traditional/modern comparisons, showing how Sowa Rigpa and modern pharmaceutical science intermingle, appropriate aspects of one another, blurring their boundaries. Theoretically this chapter builds on the ontological turn within STS and anthropology, incorporating recent critiques to arrive at a more ethnographically and historically informed analysis by taking a practical, empirical, ontographic approach (following Jensen 2004, Law and Lien 2013, and especially Lynch 2013). This comparative laboratory ontography thus argues for multiple but hybrid – as opposed to fundamentally incommensurable – realities of quality.

In what follows, I first place the laboratory within its broader postcolonial context of the interface between modern Western technoscience and Asian scholarly medicines. This sets the scene for sections 4.2 to 4.5, which are ethnographic in nature and aim: to introduce the labs of PADMA and Men-Tsee-Khang through an outline comparison of infrastructure and instrumentation, to discuss historical interactions between these labs, and to provide insight into their practices of quality assessment, which I construe as practical ontologies and enactments of ‘qualities’.

#### 4.1 The technoscience/Asian medicine intersection

If truth claims are produced through and situated in local practices, how then do science and technology travel? How are knowledge and practices mobilised, distributed and extended to new places? Within medical anthropology, the interaction between biomedical and other medical beliefs has been a central topic for decades (Good 1994, Nichter 1996). ‘Yet laboratory science, defetishized at its “origins,” still moves around the globe as a fetish, with its social relations conveniently erased. It seems to arrive with capitalism, “like a ship,” then magically arrives elsewhere, just as powerful, packaged, and intact’ (Anderson and Adams 2008, p. 182). Here, postcolonial critique is paramount, to be able to envision alternative modernities as well as contemporary globalised rewritings of imperialism. Scientific practices are inherently multi-sited (Marcus 1998), shifting the focus to heterogeneous transactions and translations between a variety of contact or trading

zones, and making issues of 'geography' at least as pertinent as epistemological/ontological considerations. Over the last few years a small number of what can be labelled as postcolonial laboratory studies of Asian medicines has emerged, raising topics particularly relevant to my argument.

Jongyoung Kim (2007) has researched how the encounter with pharmacological laboratory science translates the clinical practice of Korean medicine into an experimental one – reversing the typical order of biomedical drug discovery – in an act of legitimation fraught with uneven negotiations, tensions and ambivalent feelings. Being a subjugated 'alternative' knowledge system, it nevertheless succeeds at least partially in contesting, reconstructing and even appropriating the lab and concurrent definitions of 'science'. Korean scientists were thus able to defend and enhance the scientificity of their study object by entering the global scientific playing field. This however came at a high price: classical aetiological theory and categories were largely discarded, and herbal drugs and preparation methods standardised under the aegis of analytical chemistry, to finally publish the results in international scientific journals that further enforce these transformations. Consequently, controversies abound over the (hybrid) identity and authenticity of Korean medicine in tandem with vigorous debate between pro- and anti-scientisation factions.

Ritika Ganguly (2012), in the third chapter of her doctoral dissertation on the instigation of self-proclaimed 'open-minded', 'trans-disciplinary' science by the Hindu elite at an Ayurvedic laboratory in Bangalore, demonstrates how 'classical' Ayurvedic and 'modern' pharmaceutical science together are complicit in reinforcing and reifying the power and privilege of expert vis-à-vis folk knowledge/practice. To this end, she attended a training program on herbal quality control aimed at 'weaker sections' of society in 2009. Enquiring what kind of 'scientific' knowledge on 'quality' is produced in the lab, and how it is then distributed, she highlights the strategic application of narratives of lack and decline (see also Langford 2002).

[Q]uality' in formal discourse is not limited to the thinginess of medicinal plants alone. It is assigned a temporal property, a distinctive characteristic of a time and an era when collecting

the right plants from the right habitat at the right time was a quality in itself, possessed by plant collectors and physicians by virtue of their 'experiential wisdom' (not knowledge). But 'experience' and 'wisdom' are not qualities that can be arranged to be disseminated from 'scientific experts' to 'communities.' 'Knowledge' is. Therefore, it must be the knowledge-about-quality as a quality that may be arranged to be socially exchanged and transferred. [...] The dissemination of expertise about 'quality' (in English) and of Ayurvedic terminologies critical to this training (in Sanskrit) gives rise to a specific kind of science imagination that is universal (quality 'standards' are universal), yet national (signalled by the role that the history and lineage of Sanskrit plays in the history and lineage of India). This dissemination also gives rise to a medium of instruction in science pedagogy that may be seen as foreign, alienating, oppressive, or opaque to the 'folk' student.

(Ganguly 2012, p. 75-76, p. 94)

This excerpt raises a fundamental point, which is the areas of contrast, perhaps contradiction and conflict, between customary and industrial notions of 'quality'. It shows how experiential knowledge is devalued and substituted by 'universal' techno-scientific standards evaluated in laboratories. In a later paper, Ganguly (2014) elaborates how the use of modern scientific tools and methodologies are poised to transform the unknowable of Ayurvedic pharmacology (i.e. that which escapes the logic of its own theories and principles) into the (hitherto) unknown of biomedical knowledge. This translation refashions laboratories as places where non-Western sciences are re-searched through scientific rationalities, co-producing new identities (such as 'the open-minded scientist') and technological practices. She relates how an experiment in the standardisation of human sensory evaluations of medicinal plants in this lab attempted to make Ayurveda less subjective and more exact by normalising and calibrating the responses of a test group using international food science protocols. Not only was this homogenising exercise fraught with difficulty, it also relied on a Euro-American interpretation of the senses as separate from a sensing mind. Standardisation, then, does not just apply to materials but equally to the use of human senses and body parts as tools.

Also in India, Tibetan medicine has had to come to terms with biomedical quality control along the same lines. As of yet, there has been no forced, state-led implementation of GMP here, even though Sowa Rigpa has been officially recognised as a medical system by both

the Tibetan exile administration and the Indian government (Kloos 2013). Because of its refugee status, a new discourse was fashioned that revolves around cultural survival and the preservation of traditional knowledge. In this context, modern science has been enlisted by exile Tibetan *amchi* to play the crucial dual role of proving the worth of this medical tradition to sceptic outsiders, and as an ornament and political tool to ensure international recognition and long-term survival (Kloos 2015). However, focusing on the advent of laboratory quality control of raw materials and medicines at Men-Tsee-Khang, Kloos argues that this involves more than mere decoration. It is rather ‘a silent revolution’, the beginning of the modern standardisation of Tibetan *materia medica*. The need for this arose when during a clinical study it became clear that the efficacy of Men-Tsee-Khang pills fluctuated from batch to batch. This challenge, the preservation of Tibetan medicine through the preservation of its efficacy, was eventually taken up by the establishment of a new quality assurance lab within the compounds of its pharmaceutical production unit in 2009. Kloos explains why this became necessary:

As altruism and compassion [in the form of Buddhist ethics and adherence to textual ideals by *amchi*] are lost in the market place of greed and corruption<sup>58</sup>, the potency of Tibetan medicine suffers. Therefore, it is not that traditional quality control is inadequate today, but that it has become impossible to practice in today’s market economy. The only solution to ensure a certain level of quality, then, is the use of modern scientific methods, such as microscopic and chemical analyses, with which adulterations, moisture levels, and pollution can be detected and measured. (Kloos 2015, p. 127)

This moral decline goes hand in hand with a gradual shift in power from experienced *amchi* to the young university-trained natural scientists working in the quality control lab, although their influence is still mostly limited to documentation. Nonetheless, Kloos argues that modern scientific concepts of pharmaceutical quality will continue to shape the very foundation of Tibetan medicine, its efficacy and ethics. Broad analogies can be discerned between the pharmaceuticalisation of different Asian medical systems, especially in the ambivalent shifts from clinical to experimental validation regimes under the aegis of pharmaceutical science.

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<sup>58</sup> As Kloos (2015) notes, the vast majority of Men-Tsee-Khang’s raw materials are purchased from wholesale markets nowadays, leaving the Institute with little knowledge or control over the sourcing process. The link between greed, ‘corruption’, and India’s herbal trade is analysed further in Chapter 2.



## 4.2 An outline comparison

Before delving into the laboratory worlds of PADMA and Men-Tsee-Khang in turn, I will first provide a rough sketch of both, by means of a superficial comparison of laboratory infrastructure and procedures. This simple, direct approach is, however, dangerous as it ignores the substantially different socio-political, economic, and historical backgrounds that are pertinent to these companies, and to Switzerland and India, potentially distorting their realities along either modernist or orientalist lines. Still, comparative laboratory studies can show the disunity of science; how lab organisation, methodology, and labour ethics vary between cultures and nations (see for instance Traweek 1992). When considering the construction and spread of accepted knowledge outside its seemingly singular place of origin – ‘with laboratories’ (Knorr Cetina 1995) – then terms such as negotiation, translation, and the enrolment of actors more easily come to the fore. Nevertheless, what comes across to the uninitiated eye is first the sameness of both companies’ labs: they are both ostensibly modern pharmaceutical quality control laboratories of roughly the same size, structure, and activities, as evidenced by the presence of fume hoods, precision balances, glassware, and so on (Table 4.1). The university-educated staff working in both institutions pointed out to me that what they are doing are rather basic, routine tests well-known in the fields of microbiology, pharmacognosy and analytical chemistry for decades.<sup>59</sup> But at times, there was also a palpable sense of novelty. Indeed, applying these methods to Tibetan medical ingredients (in crude, powder, and compounded form) requires innovation as well, as will be described below. Although PADMA’s *Labor* is slightly larger in terms of working space and staff and equipped with some more advanced analytical machinery (notably HPLC, High Performance Liquid Chromatography), many of its facilities and equipment are actually

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<sup>59</sup> The analysts know about and may have worked with more expensive, cutting-edge technologies previously during another job, internship or dissertation, such as DNA sequencing or mass spectrometry. One of PADMA’s two full-time analysts for instance, Emad (in his forties, born in North Sudan) reminisced about working at a pharmaceutical multinational as part of a large, specialised team while Norlha (in her thirties, Tibetan born in India) shared stories about high-tech and fast-paced laboratory life at a South Korean University during her dissertation research. See Droney (2014) and Tousignant (2013) for the irony of core-periphery dynamics and nostalgia for the temporalities of centres of innovation.

older (albeit very well-maintained). The work benches at PADMA are arranged in rows (see again

Figure 4.2), whereas at Men-Tsee-Khang they line the walls of the lab and offer more spaces to sit down on chairs. PADMA's lab staff is organised into a formal three-level organisational hierarchy that is absent in Dharamsala, although there they also report to the Heads of the Pharmaceutical and Herbal Products departments. A more conspicuous difference with Men-Tsee-Khang's Quality Assurance Laboratory (QAL) is the absence of microbiological screening in-house – a major activity at QAL – and several more analyses that are carried out externally by specialised commercial labs for PADMA (including microbiology, and the costlier quantification of contaminants such as heavy metals, pesticides and aflatoxins). On the other hand, no Tibetan medicine practitioner is employed at the Swiss company to ascertain the taste, potency, and characteristics as prescribed by Tibetan classical texts. Finally, another contrast with far-reaching consequences concerns the paper worlds of documentation and regulation. Staff at both labs were occupied with reading and following quality monographs and specifications during each experiment, writing down or printing the obtained results on paper protocol sheets or in record notebooks and later inserting the numbers into a larger digital database. When a new sample arrives in the lab, it is first registered and given a unique identifier tag. Each piece of analytical equipment also comes with a logbook (at QAL for its distillation unit, fume hood, furnace and water bath), which documents its use and maintenance routines. At PADMA however, this pharmaceutical bookkeeping is necessarily taken to another level. After a few days, it quickly became clear that Barbara, Emad, and Brigitte spent much more time with documents and behind their computer screens than they do at the laboratory bench. As Kloos (2015) already noted, documentation remains a final challenge for Men-Tsee-Khang's production unit to be fully Indian GMP compliant, adding to the somewhat puzzling question as to whether documentation is for the sake of quality control or the other way around. PADMA's laboratory office walls are lined with shelves and cupboards filled with rows of thick folders titled 'Raw data validation methods', 'Out of specification reports', 'Qualification of established laboratory equipment', 'Process validation Preparation Nr. 017', and so on, representing an overarching level of quality assurance (not just 'control'), which will be elucidated under section 4.4.1.

**Table 4.1. An outline comparison between the laboratories of PADMA and Men-Tsee-Khang.**

	PADMA's Labor	Men-Tsee-Khang's Quality Assurance Laboratory (QAL)
date of construction	1947 (founding year of Cosmina AG, who initially occupied the building), taken over by PADMA since 1986	2009 (2002-2008 smaller, attached to Herbal Product Research Department)
location	Cosmina industrial area (now houses Frike Chemicals, who produce cleaning agents), second floor, Wetzikon	Men-Tsee-Khang Pharmaceutical Department, first floor, Gangchen Kyishong
staff (role)	Erich (Qualified Person); Nevenka (Head); Barbara, Emad, Brigitte (Analysts)	Phurpu, Norla (Analysts); Tenzin Tadze (Analyst, plant morphology)
office space	analysts' office with three desks, head and QP office, shelves filled with many documentation folders and some books	three desks with computers, bookshelves, table, sofa
lab rooms/Units	entrance, corridor, main room with microscopy bench and archive shelf, TLC room, milling room	main room, Microbiology/Sterilization unit, Inoculation unit, Instrumentation unit
regulatory authority	Swissmedic (Swiss Agency for Therapeutic Products)	AYUSH (Government of India), CCTM (Central Tibetan Administration)
quality control reference	European Pharmacopoeia, Swiss Pharmacopoeia	Ayurvedic Pharmacopoeia of India, Quality Standards of Indian Medicinal Plants, WHO Quality Control Methods for Herbal Materials
internally tested parameters	odour, taste, macro- and microscopic characters, TLC, foreign matter, quantitative phytochemical assays (e.g. tannin content)	moisture and ash content, alcohol and water extractive value, presence of phytochemicals, bacterial and fungal counts, TLC
externally tested parameters (executed by)	total ash, loss on drying, pesticides, microbiological purity, heavy metals, aflatoxins (outsourced to specialised commercial laboratories)	sensorial evaluation and comparison with classical and contemporary works on materia medica (experienced Tibetan pharmacologists)

### 4.3 Historical inter-laboratory exchanges: translocal flows and frictions

From the previous paragraph it would seem that the two laboratories are separate entities even though there are significant parallels. The reasons for these similarities deserve more detailed attention here. As some within postcolonial studies caution (Anderson and Adams 2008), it is too simplistic to assume that laboratory science and technology can just be duplicated or transplanted from some vague centre of modernity as a full package, without any (ex)change, negotiation and transformations. By introducing key historical moments of communication, technology transfer, and knowledge exchange between PADMA and Men-Tsee-Khang, I hope to show how these institutions shaped each other's quality control practices as well as the ontologies on which these are premised. The first and also foremost interaction I will cover revolves around the Tibetan monk/physician Tenzin Thaye<sup>60</sup>, who acted as an important mediator between Men-Tsee-Khang and PADMA. In 2014, we had a nearly two-hour long conversation at the doctors' office in the Pharmaceutical Department (Audio recording 86). In the background, we could hear the buzz of a blistering machine packaging precious pills, as well as mechanics working outside of the machine maintenance workshop downstairs.

JVDV: I don't know when, but you also went to Switzerland, to PADMA for a while for a visit. Why?

TT: Actually, I think it was in '97 about. Or '98. This was because Péma 28 [many Tibetans use this as the name for PADMA AG, the company as well as its main product] had contact with Men-Tsee-Khang, to send a doctor from the pharmacy. 'We want to show all the work, and can tell how to do good quality control.' That

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<sup>60</sup> Tenzin Thaye was born in 1965 at Amdo Ngawa, an Autonomous Prefecture of Sichuan Province, PRC. He started his formal study of Tibetan medicine in Amdo, in the late 1970s. First he attended a professional middle school in the city of Bangkam for a year, after which he transferred to a *menkhang* (Tibetan medical institute, literally 'medicine house') in Dzorgé for three years. After memorising the First, Second, and Fourth Medical Tantras as well as Dési Sangyé Gyatso's *mengak lhenthap* (instead of the very lengthy Third Tantra), he worked in the clinic of a nearby town for two years. He was one of the youngest students of his year, and felt he needed more study. Since Lhasa Mentsikhang would not allow him, he fled to India in 1987. At Men-Tsee-Khang in Dharamsala, he attended the college again from the second year onwards. In his fifth year he then completed a six-month internship in Bir. From 1992 to 1996 he spent most of his time in the remote Indian Himalayan state of Arunachal Pradesh, as a practitioner at Men-Tsee-Khang's branch clinics in Tawang and Bumdila. In 1997 he was finally allowed to transfer to the Pharmacy Department, which was his main interest all along. Dr Thaye is currently appointed as Deputy Head of the Pharmaceutical Department, and has served as Personal Physician to His Holiness the Dalai Lama (the most prestigious title a Tibetan doctor can receive) since 2011.

time we had a few doctors in the pharmacy. Men-Tsee-Khang sent me away. I was there for three months. That time, my English was very very poor. So in Péma, we did a schedule. A few weeks in the main office [to see] how they are doing, two weeks in laboratory, and two weeks in production.

JVDV: I also went to PADMA for my research. I have visited three times already, and stayed for six weeks last time. I visited the different departments just like you. How was this experience for you?

TT: In a way, very good. When a doctor is producing medicine for individuals, you can compound this medicine according to your experience. In the pharmacy here... (his mobile phone rings, he apologises)

But like here in a common pharmacy, it is very important: standards. What they are doing there [in PADMA] is very good. Whatever [they do], these people just follow steps. Also here, we are doing this and are trying to create this, to be clean, but not like what they do. They only have a few plants and medicines. They also don't have much raw material. They can order batch by batch, but here we have so many herbs, and produce so many different medicines (the official number of produced formulas is 172). It is hard to cut each step, it is impossible. But it is also really good to try to follow each batch, one time or a second time. It's really important. Also storing and all this, we have really improved a lot compared to before. Of course Tibet is a very clean area, now here [in Dharamsala] not so. We have to be careful in cleaning and storage. These kinds of things they are doing very well and we have also improved a lot. Still we have to improve more, but it is already good.

JVDV: When you came back after your internship, did you suggest some changes here?

TT: Actually, after coming back that was my main aim. I explained all things to the doctors. What we can do. Like that.

JVDV: You learned over there and here you tried to apply.

TT: Mostly about the hygiene they [again PADMA] are doing very well. Now we have also improved a lot.

JVDV: Were you also involved in setting up the quality control lab here?

TT: Actually, I was not involved. Men-Tsee-Khang had this plan to build it for a long time.

Dr Thaye speaks highly of PADMA but does so without denigrating Men-Tsee-Khang's position, recognising that the circumstances of production are difficult to compare. Befitting a monk, he is also very humble when it comes to his own contribution to the establishment of GMP practices. PADMA employees at all levels fondly remember his visit, respect him, and consider him as a good friend of the company. Alexandra Schwabl, who leads PADMA as managing director together with her husband, shared that at the time when Tenzin Thayé was at PADMA, he looked at the raw materials, and that at this time they got the most transfer of ideas (Audio recording 102). A particular example of this was given to me by Walter, the warehouse manager, who has been employed here for more than fifteen years. While we were taking samples from recently arrived bags of costus root at one of the depots to take to the lab for analysis (3 February 2014, Notebook VI, translated from German), he said he knows the roots well from the time manual sorting of raw materials was still done at PADMA. Costus was one of those herbs that came with a lot of dust, making sorting an unpleasant job. 'It smells sweet but the taste is bitter', he added, 'some people don't like the smell, like the owner of this warehouse'. 'We used to throw away the roots that were like rubber when you bend them, until that monk came and told us it was normal.'

A second important series of quality control exchanges took place about ten years after Tenzin's internship. At that time, two small delegations of PADMA staff were dispatched to visit raw material suppliers in India. The recent enforcement of Good Agricultural and Collection Practices (GACP) urged the company to formally inspect and educate growers and harvesters at the source of their supply chain. As part of a first visit in 2006, Rolf (Head of Production) and Susanne (Purchasing Manager and Qualified Person at that time) also stayed in McLeod Ganj for three days. At Men-Tsee-Khang, they were given permission to enter the Pharmaceutical Department by Dawa, who was the Director during that period (2005-2010). They were given a detailed guided tour of the different rooms and technical installations, a rare opportunity for any outsider which likely presented itself in response to PADMA's openness to Tenzin Thaye a decade earlier. During an interview in his office at PADMA *Produktion* (Audio recording 99), I asked Rolf about the exchanges that went on. The Pharmacy was interested in getting some expert advice in two interrelated domains:

on technical aspects (machine operation and maintenance, Rolf's area), and on how to implement quality assurance as a concept. In return, Rolf and Susanne had brought several samples of herbs (including myrobalans and costus) that are used in PADMA products, 'to get them evaluated from the Tibetan perspective', and to check 'whether we had the right species and quality'. Rolf added that Tibetan doctors judge identity and quality organoleptically, which is what they had asked them to do. The doctors approved. Within the same minute, Rolf evoked 'quality' twice, but with different meanings: modern (Western) pharmaceutical versus traditional Tibetan medical quality. This rather stereotypical interaction in which each institution plays its own role – PADMA instructs Men-Tsee-Khang on modern quality, and the other way round for tradition – builds on the following underlying assumptions: (1) pharmaceutical and Tibetan quality (control) are separate entities (adhering to the modern/traditional dichotomy), (2) both are valid and necessary, as well as (3) complementary. Martin Saxer (2013), in his ethnography on the recently emerging Tibetan medicine industry in China, has made a similar point in respect to the complementarity of Chinese GMP standards (as laid down in the Chinese Pharmacopoeia) with classical textual prescriptions on the processing of herbal compounds (*yenlak dün, Seven Essential Limbs*) as mentioned in *Gyüzhü*, the foundational work of Tibetan medicine. They are not fundamentally incompatible per se according to Saxer. Different notions of quality do not necessarily contradict or preclude each other in practice, but mismatches have occurred as a side effect of the rapidly enforced implementation of GMP. Instead, the commercialisation of the raw materials trade is often blamed for the contemporary decrease in quality by Tibetan medicine professionals.

In 2009, PADMA staff traveled to India a second time for the same purpose, again visiting Men-Tsee-Khang. Alexandra was interested to see how their production operated and what issues they were facing. This time, they could visit the brand-new Quality Assurance Laboratory as well. I spoke to Alexandra about her experiences there (Audio recording 102). She felt that the people in the lab were enthusiastic and open about their work, and was impressed by the presence of a number of modern laboratory instruments. But, she added that the analysts told her they have no power.

You have seen how it works at PADMA. If Erich (the Qualified Person, responsible for the final market release of each new batch of products) says no, it's no. All production stops. That's not the same at Men-Tsee-Khang. They can give some advice, can talk, but cannot stop or change anything by their own. They are young people, and were very enthusiastic at this time. They are investing in instruments but not in structure, was my impression. At this time, they even had a new blistering machine. Tendzin Thayé was trying to make it work, it was just [standing there, wrapped in] in plastic. It was a nice thing, but didn't solve the main problem: the humidity of this place. They have some good things like a cooling house, but it doesn't help much if they are facing what to do in this humid environment. It is some pieces, but no system. What was very impressive was to see the people sitting and sorting the materials. The way they are doing it is with passion, very carefully. That is very beautiful to see. The director at this time told us they are planning a new production site somewhere near Delhi. All big projects... There are some small easier things to do in Dharamsala that would help more.

Alexandra as well as other PADMA employees are equally careful and nuanced when it comes to making comparisons with Men-Tsee-Khang, just like Dr Thaye. There is a mutual recognition that they are in the same boat (Herbert once used the German expression *Unter uns Klosterschwestern*, 'amongst sisters of the convent', in this regard), in the same business. Facing some similar practical problems in production and quality control, but in very different national and regulatory contexts. Over the years, PADMA has learned to steer clear of sensitive topics such as mercury and heavy metal 'contamination' and toxicity of Tibetan medicines (see Chapter 5). Nonetheless, both parties involved are aware of each other's views. In the quote above, Alexandra further contrasts the execution of laboratory quality control tests with quality as a system, which will be discussed under section 4.4.1.

Herbert related a third, less direct exchange between the labs of PADMA and Men-Tsee-Khang (Audio recording 47). QAL was approached by an Indian representative of the Swiss company CAMAG, the self-professed world leader in thin-layer chromatography (TLC) instruments. The analysts were interested in purchasing the tools necessary for High Performance TLC or HPTLC, which includes an automatic sampler as well as a visualisation-documentation system. The total budget was estimated at 8,284,000 INR or 142,828 CHF (more or less equivalent to USD) in September 2012, and a Large Project was developed



and published by Men-Tsee-Khang (Project B-02, [men-tsee-khang.org](http://men-tsee-khang.org)<sup>61</sup>). PADMA was subsequently contacted as a potential sponsor, and responded favourably on the condition that they would reconsider what equipment was actually needed and then compare offers. Herbert explained to me how this promising exchange came to an unfortunate end:

We use CAMAG equipment, it's a Swiss company. We told them, 'we know their machines really well. It is a Swiss company. For 30 years we have used CAMAG machines. You don't need this and this equipment, you need this and that. We also don't have the fully automatic version. After 20 years we still work with the oldest one. It's fine enough. You don't need the top-computerised, highly expensive one. Take the almost cheapest one, it's good enough, serves the purpose.' They didn't believe us. Maybe they thought [that we meant] 'you Indian guys, you can use the lower quality one.' [...] We crossed out anything we ourselves didn't have. We know these are just add-ons. You can buy Rolls-Royce; it is also a car. If you need a truck, buy a truck. It's enough to go from A to B. Especially at the beginning, don't buy the high-end stuff. This misunderstanding made our relation more difficult. Even after years, we still have this misunderstanding. But we did not stop to tell them our opinion somehow.

This failed collaboration once again brings the specter of (post)colonialism to the stage in relation to what could be interpreted as an example of technology transfer. While the QAL staff were aiming to modernise their quality control by obtaining high-tech machinery, PADMA did not consider their choices to be efficient, economical or even necessary to a certain extent. This mismatch in turn gave PADMA the bad image of not granting Men-Tsee-Khang its needed progress (especially beyond PADMA's own level), while QAL seemed to have fallen for the CAMAG sales pitch and the idea that newer is always better. The deal was off. No alternative funding has been obtained so far for the HPTLC installation.

Finally, Herbert made me aware of how a change in PADMA's production influenced the quality of the medicines as perceived by *amchi* (Audio recording 47). Over the years, the whole production process (from dosing the powders until packaging) had become faster

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<sup>61</sup> The goal of project B-02 was defined as follows: 'To improve the quality of Tibetan medicine according to today's Good Manufacturing Practice (GMP) standard by maintaining the standard prescribed in the treatise of [the] Traditional Tibetan medical system'. The objectives were '(1) to explore scientific evidence of Tibetan medicine, (2) to standardize the quality of Tibetan medicine and its crude drugs, and (3) to guarantee the potency and efficacy of Tibetan medicine'.

and more efficient following the increasingly stringent implementation of GMP. Throughout the manufacturing, the product is always kept in a sealed, protected environment: as a powder in drums, as capsules in sealed bags, and then in blisters and boxes. There is no opportunity for the mixed powder to come into contact with air for longer than two or three hours in total. This is in stark contrast to how pills are made at Men-Tsee-Khang (see Chapter 5), where the compounded powder is rolled and compacted into small balls by adding water to it in a slowly spinning vessel. These rounded pills are then left to dry in open air and fully exposed to the sun for several days, depending on the weather. Not even considering the GMP compliance of the drying location, method, and air, this would be disastrous from a European perspective: as the plant cell walls were destroyed by grinding, nearly all essential oils oxidise and evaporate, severely affecting (European herbal) quality and efficacy.

Some [Tibetan] doctors even complain that the PADMA 28 formula has become sharper. From the Western concept it is fresher, from the Tibetan medicine point of view it should age more. This is definitely a contradiction we cannot solve. The concept of how herbs are active by essential oils is so deeply rooted in Western science. When you say you want to get rid of them by ageing... it's a task too complicated. You have to argue 'why?', a battle [with EU and Swiss regulatory authorities] you cannot win. That's a quite unexpected feature of modernised production. [...] There is let's say a contradiction. A perception how plants function in Western pharmacology; what we think is a high quality plant, and apparently the Tibetan concept of quality. (Herbert, Audio recording 47)

This led Herbert to conclude that Tibetan medicine has no concept of stability in the modern pharmacological sense, even though there are limits to how long you should ideally keep herbs and medicines. It also relates to the classical prescription that warming potency herbs should be dried in the sun while cooling herbs should be kept in the shade to maintain and strengthen their inherent qualities. However, this turned out to be as good as impossible to ensure for both PADMA and Men-Tsee-Khang since they both have to rely on external harvesters, growers and suppliers enmeshed in the Indian herbal trade and beyond (see Chapter 2). An ontology of quality may be present in classical texts, but practical performances of these ideals are always partial. Similarly, people, concepts and technologies do not travel easily between dissimilar locales as presumed by diffusionist theories of science, but are transformed along the way.

#### 4.4 PADMA's Labor

Since the inception of in-house laboratory facilities at PADMA in 1985, three members of staff have been key in its development: Rolf, Alexandra and Erich. I was able to interview each of them on their role in working in, managing and expanding the Labor over the years even though Rolf retired later in 2016. It was Rolf Lienhard, the son-in-law of Karl Lutz (PADMA's founder), who instantiated the first laboratory in the 1980s. He explained to me why they decided to do so (Audio Recording 55). In 1985, PADMA got a quite large order from the US, for which the first production site was considered too small. Rolf and Mr Lutz (or *Herr* Lutz, as he is still addressed by PADMA veterans) found a new suitable location that could house larger production rooms for dosing and mixing. In April 1986, they moved to the same building still used to date. Until then, all analyses of raw materials (mainly organoleptic testing and microscopy) were carried out externally by one single person: the Zürich pharmacist Dr Andres. The game changer here was however not only increased production, but also more stringent government control. Since its registration as a medicine in 1977 (Swissmedic No 35872), the Swiss health authorities revisited the dossier of PADMA 28 every five years. This time they came with critical questions on quality, as did the German authorities where the company was exploring to enter the market. Lutz decided to install his own lab in one of the vacant rooms of the new production site. Rolf and Rüedi – Dr Andres' son who was then a pharmacy PhD student at University of Bern – developed the laboratory together: a microscope was purchased (still used today), as well as quantitative TLC equipment (the scanner is also still in operation). Rüedi Andres trained Rolf in these methods, and together they put together PADMA's first in-house monographs for the 'Asian herbs' of PADMA 28 that were not to be found in the Swiss Pharmacopoeia as well as for the mixture, under the supervision of Andres senior. These were exciting times. Between '87 and '88, Andres junior made a series of colour drawings, detailing the macro- and microscopic structure of each raw ingredient of PADMA 28 (see Figure 4.1 below for aconite). Rolf enjoyed developing proper TLC methods, chiefly relying on two German publications that were established references at the time: Wagner et al.'s (1983) illustrated TLC atlas for medicinal plants and the fourth edition of *Hager's Handbuch der Pharmazeutischen Praxis* (Kern et al. 1969). Finally, the Swiss health authorities accepted the renewal of the registration.

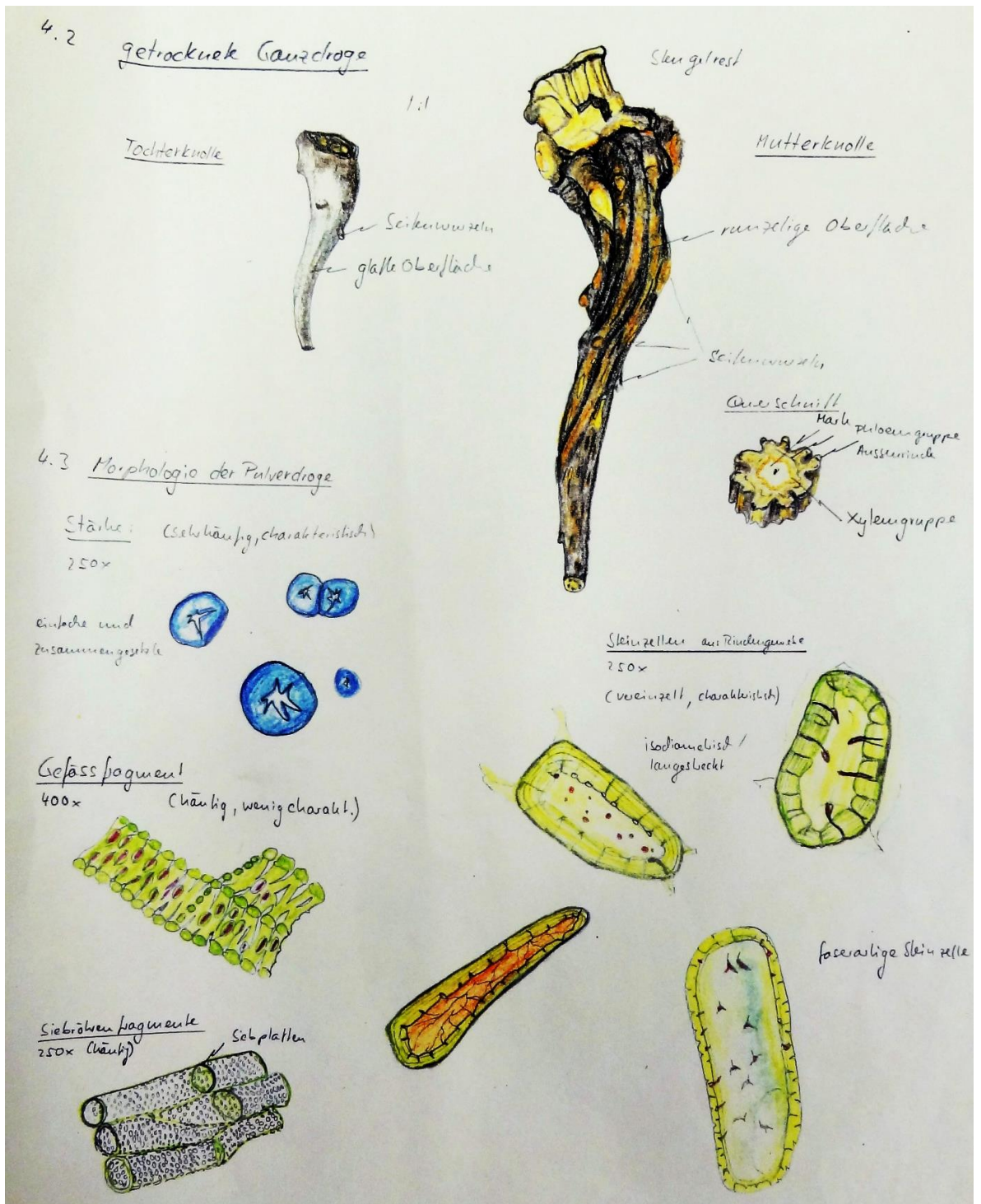


Figure 4.1. Photograph of part of the original documents with pen and aquarelle drawings of PADMA 28 herbal ingredients by Rüedi Andres. This page is titled *Aconiti Tuber (Aconitum napellus)*, and his name and the year ('87) are written in the bottom right corner (not included here). It includes illustrations of the crude herb (mother and daughter roots, cross section), and of cellular structures present in the powdered drug and visible through a microscope at different magnifications.

After talking through this early history with Rolf at his office, I asked him if he thought that the quality of individual herbs and thus also of PADMA 28 could change over the years because of changing suppliers, or perhaps changing quality control or production processes. This leading question provided me with the following response:

Mainly the method of analysis has changed. You have not to forget that humans are also quite good analysis tools. You have taste, and you can see it and feel it. It is not so bad. What we have done when we developed the analysis methods, we took the material we had and Tibetan doctors told us: 'you have to use this myrobalan'. The five (as indicated in Rüedi Andres' drawing of this species) or seven-ribbed one. We have developed our analytical methods on this basis. [...] During sorting, we have sorted out the other types. When we started to find our own suppliers in India, we gave them samples. That's what we wanted, what we are looking for. Then they delivered us the material. We told them also a range in the size, and how the colour had to be after drying. When they dry them too hot, they are burned, they are more black. We gave them some simple parameters.

Using myrobalan as an exemplar for 'Tibetan' or 'Asian' herbs, he argued that scientific quality control techniques have not fundamentally changed the identification and quality of the plants involved since (at least some) of the parameters are based on traditional, textually-traceable Tibetan medical knowledge. Within the constraints of the available knowledge on Tibetan medicine and technoscientific sources, technologies and regulations at the time, Rolf together with Andres junior still had considerable freedom to decide on the quality parameters at least for plants not listed in the Swiss Pharmacopoeia, allowing them to craft a scientific monograph which integrated 'traditional' characteristics. As such, they created a new, practical ontology of quality.

From 1996 onwards, PADMA's lab was expanded and modernized under the impetus of Alexandra, who became the new Head. The lab was physically separated from the production site and its manager (Rolf), and moved to the Cosmina industrial area nearby where facilities were available for rent. Academically trained as a chemist, Alexandra immediately felt at home in the laboratory, but not so much with plants initially (Audio recording 44). She was used to chemical analyses such as chromatography with precisely defined standards and chemical substances, not with herbs where it is difficult to even

decide on the proper markers. Plants are what chemists would call a complex and variable matrix according to Alexandra, even the same material coming from the same supplier. This makes quality control very exciting and less routine compared to chemicals. PADMA 28 is not the same every time, and one has to find out what is significant and what not. Still, she maintains that the basic problems and methods are not so special for analytical chemistry, but similar to water or soil analyses for instance. Some of the changes that were gradually implemented in the lab are (Audio recording 56): a fridge for the standard materials, the introduction of a lab journal, and new analytical machinery including a UV photometer, gas chromatography (GC), and finally HPLC (High-Performance Liquid Chromatography). The primary reason for this expansion was again related to a strong increase in yearly production: from five batches in former times to twenty. Before, some analyses were outsourced to an external lab, but this avenue became financially unattractive. PADMA also wanted to be more independent. This increased control over the quality control of its products granted the company more power to directly influence not only the initial definition of what quality 'is', but also how quality is measured (i.e. constructed) in practice.

Around the same period, PADMA's popularity reached unprecedented heights in Switzerland and beyond after the widely disseminated documentary film by Franz Reichle on Tibetan medicine: *Das Wissen vom Heilen* (1996), or *The Knowledge of Healing* in the English-language format.<sup>62</sup> Moreover, PADMA 28 was put on the national list of medical products reimbursed by the Swiss health insurance from 1998 onwards, further boosting its sales figures. Erich fondly remembers these first years of his career, which started in 1999 as a deputy under Alexandra (Audio recording 67). The documentary had created a veritable hype. Production at PADMA was now taking place in day and night shifts (which is not the case anymore presently), and even then there were times between '97 and '98 where apothecary windows across Switzerland would have a notice to customers saying that 'PADMA 28 is temporarily sold out'. Due to this peak in demand and production, quality control had to be strengthened to keep track. In the euphoria of the moment new product development projects were initiated at the laboratory (PADMA 69, PADMA 8), and

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<sup>62</sup> This event was also briefly covered in Saxer's (2004) documentary, see more in Chapter 6.

steps were undertaken to gain a foothold in the American market. Staff at production and in the lab more than doubled. As the hype faded out from the year 2000 onwards and as production stabilised, many of these ambitions were put on hold as the amount of personnel was reduced. A lasting change however, was the separation of the laboratory office space from the workbenches where the actual analyses take place. This not only reflects ever more detailed GMP regulation of all aspects of pharmaceutical production (including the need to compartmentalise), but also likely the increase in time spent by analysts behind their desks. The dread of endless GMP documentation duties was a frequent lament by workers at all levels of the company, but this trend towards increasingly administration-based quality concepts proved to be unstoppable.



Figure 4.2. The workbenches at PADMA *Labor's* main room on 24 January 2014.

Arriving at the ethnographic present (2014 in this case), the analysts have to follow a strict set of procedures in conducting the experiments using pharmacopoeia-standard methods and instruments, observing if the values obtained for each batch produced are within the specified limits, if they conform or are out of specification. Founded in 1964 as a subsidiary of the Council of Europe in Strasbourg, the European Directorate for the Quality of Medicines and Healthcare (EDQM) aims to protect public health and ensure equal access to medicines and healthcare of good quality to all EU citizens by developing, harmonising, and monitoring quality standards for medical substances. Its main legal and scientific reference is the European Pharmacopoeia (Ph. Eur., fully incorporated in EU legislation since 1975), which is legally binding in thirty-seven states of the Council of Europe (including the twenty-eight EU members).<sup>63</sup> Its governing body, the Ph. Eur. Commission consists of members from government, academia and industry who meet three times a year as well as separately in Groups of Experts and ad-hoc Working Parties. Twelve percent of edition 8.0 (2013) is directly related to herbs (Bouin and Wierer 2014), including 187 herbal monographs and eighty-five herbal drug preparations. Besides laying out pharmacognostical and microbial testing methods, the monographs themselves typically cover the following sections: (1) definition (processing state of the drug, scientific name, sometimes minimum content of certain constituents), (2) identification (macro- and microscopic botanical characters, thin-layer chromatography profile), (3) purity tests (foreign matter, loss on drying, heavy metals, etc.), and (4) a quantitative assay (of therapeutically active or analytical markers). This set of parameters and the limits set to them sufficiently define the pharmaceutical (laboratory) quality of plants. Obviously, there is 'no modern discourse without the atomic concept' (Schwabl et al. 2013, p. 191) as applied in analytical chemistry, nor without the species concept and the practices of botanical

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<sup>63</sup> The historical emergence of pharmaceutical quality control by means of pharmacopoeial standards lies outside of the scope of this chapter, but is of course interwoven with the modernising projects of state formation, industrialisation (the dangers of mechanised mass-production) and the rise of global (supply chain) capitalism. Nonetheless, it is interesting to note here how doubts on the composition and later the efficacy of multi-compound panaceas such as 'theriac' stimulated medicine regulation and the standardisation of quality from the eighteenth century onwards in Great Britain (Griffin 2004). Obviously, pharmacopoeias do not just specify standards. Anderson (2010) for instance shows that consecutive versions of the British Pharmacopoeia served as an imperialist instrument in India: regulating trade in herbs and medicines in favour of the coloniser, promoting Western medicine while suppressing others, and infiltrating medical education. The historical and political-economic dimensions of the standardisation/commercialisation/industrialisation/pharmaceuticalisation of Ayurvedic and Unani medicines have already been detailed by Bode (2008) and Banerjee (2009).



taxonomy (cf. Chapter 1). Nonetheless, aspects of textual Sowa Rigpa quality may still be incorporated.

A short excerpt of an interaction between me and the most experienced analyst, Barbara, during an organoleptic test of PADMA 28 powder from capsules (Audio recording 46, translated from German) illustrates that there is still room for the same sensorial characteristics used by Tibetan doctors in modern laboratory quality control. Barbara was trained as a nurse, and started working in the lab three months before Erich arrived in 1999. She was initially hired to maintain the lab equipment, and then gradually took on more and more analytical duties.

Barbara: You have to compare like with like. I have been working in this manner for years [referring to the relative positions of sample and reference]. This is the sample (*die Probe*) and this is the reference. Here we have the specification: ‘hard gelatin capsules, transparent, and so on’. You can try out how it tastes, the sample. Don’t read [the expected result] first (laughing)! What taste (*Geschmack*) do you get?

Jan: Are there not several? (I try to remember the taste and potency of camphor – PADMA 28’s lead ingredient – according to Tibetan medicine, but remain in doubt.)<sup>64</sup>

Barbara: Yes, but is it more sweet, salty, sour? Here [in the specification] it says it is bitter, and a bit hot. Now you can try the reference. You can take it with a bit of water if you like.

Jan: Bitter comes later, it’s not salty or sweet.

Barbara: And not sour! You taste sour (we laugh)? Every person tastes differently, but when you do it a lot... Would you say the sample conforms? Then comes odour (*Geruch*). [...] In our finished product [monograph of] PADMA 28 it also says ‘tastes like camphor’. These are the gelatin capsules. I could make a note [if necessary]: ‘caps are not good’.

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<sup>64</sup> According to *Gyüzhi*’s famous commentary *the Blue beryl*: ‘[c]amphor is said to have a primary bitter taste with threefold combination of bitter, hot and astringent’ (Clark 1995, p. 126). Camphor is categorized as a tree medicine, and the resin is of three types. All three treat high and chronic fevers.

- Jan: Can it be that the taste is not correct?
- Barbara: Yes, in the case of the raw materials it is very important we do it. There could be a mistake, something else inside the bottle. I can [also] see if this is brown, and that is yellow. Under the microscope and with chromatography you will see it doesn't comply. Could be a wrong label. That's why we always have to do all the parameters. We cannot say 'not today'.

The importance, meaning and purpose of taste (*ro*) in Tibetan medicine is very different from its application in the situation above. Instead of an element-based carrier and indicator of potency, taste here is applied as a rather straightforward test – which is clearly still subjective (see again Ganguly 2014) – that helps establish the identity of single-ingredient powders or mixtures. In this context, this assessment does not impinge on pharmaceutical quality *sensu stricto* (as defined by the presence/quantity of specific active substances or markers), nor on efficacy (which is not even evaluated during quality control, but proven before and during medicine registration). As ethnopharmacological studies have shown, chemosensory perception is a key criterion for the classification, selection and medicinal use of plants that is both individually and culturally specific, reflecting differing notions of illness and efficacy (Pieroni and Torry 2007, Shepard 2004). Organoleptic assessment is yet another instance of the enactment of a hybrid ontology of quality unique to PADMA.

#### 4.4.1 Quality beyond the lab: The Qualified Person, Quality Assurance and risk analysis

The conception of pharmaceutical quality utilised at PADMA is not confined to a single laboratory or to laboratories in plural, including externally consulted labs where analyses are performed to verify parameters of physicochemical and microbiological contamination. More than two hundred tests need to be done in total for the quality control of one batch of PADMA 28. Not only each raw material (*Droge*), but also every active pharmaceutical ingredient (*Wirkstoff*, in powder form), and once again the powdered mixture (*Fertigmischung*) contained in the final medical product (*Arzneimittel*, including the capsules enveloped within primary and secondary packaging materials, blisters and boxes)

ideally have to conform to a specific list of specifications. When all necessary tests on a batch of finished medical product have been conducted, the results are summarised in a Certificate of Analysis. Yet there is another vital step before the medicines are allowed to be distributed and sold (i.e. released on the market): oversight and certification by a Qualified Person (QP). The QP indeed has to be qualified: s/he needs a relevant academic qualification (in the case of Erich a Masters in Biology), years of pharmaceutical experience, and has to pass particular training and examinations. It is Erich as an individual who is legally liable for bringing PADMA products on the Swiss market, a great responsibility. The decision to release a batch onto the market is not just a black-and-white assessment of the test results, but requires careful consideration. It is not difficult to imagine a case where over more than two hundred tests on more than twenty different ingredients, one or two parameters could be out of specification. A slightly elevated ash content of costus root powder for instance (say 10,4% instead of the specified 10,0%), indicating the presence of some more inorganic (soil) particles than usually allowed. This then has to be formally documented as a deviation and the results monitored across batches and presented to the regulatory authorities, but the Qualified Person can decide it has no significant effect on the overall quality of that particular batch of final product. This flexibility of interpretation is an example of where the seemingly incontrovertible pharmaceutical quality parameters can be re-assessed and overruled, leaving some space for more pragmatic re-definitions of quality in practice. This is especially important when dealing with multi-compound plant-based products that are inherently variable. Here, the limits of standardisation are reached in the literal sense. Erich explained that his assessment depends on the extent of the deviation, the specific parameter involved, if it pertains to identity, quality or purity, on where in the production process the materials are, the dosage, on his knowledge of the raw material supplier, and so on (Audio recording 100b). The underlying logic of his decision is risk estimation, which brings us to another, encompassing layer of quality: quality assurance (QA) and risk analysis.

Holger summarised his job description for me (Audio recording 63). It stated that he is responsible: (1) for the QA concept of the company (German QS: *Qualitätssicherung*) and the more than a thousand documents of the QA system (including SOPs, manuals, and

operating instructions) to manage, revise and release these, (2) to keep track of the developments of (inter)national guidelines and implement where appropriate and necessary, (3) to make sure that qualifications, validations and process analytics are carried out correctly, (4) for all staff GMP education, and (5) to do internal and external audits (commercial manufacturers and analytical labs) to assess and improve the system. Since the Head of QA cannot inspect himself, it is the QP (Erich) who performs this role. On top of that, every two years there is a general GMP inspection of the entire company by Swissmedic. When I asked Holger about how risk analysis is undertaken, he replied that every company can decide on its own how exactly it is done, but one has to adhere to the relevant legislation and guidelines. He opened the Eudralex website on his computer: 'Ah, Pharmaceutical Quality System (Eudralex Volume 4, Chapter 1), that's Quality Risk Management'. This guideline is meant to aid in the interpretation of the EU directive on GMP for medicinal products for human use (2003/94/EC). It clarifies the hierarchical inclusion of Quality Control as part of GMP, and of GMP as part of Quality Management. The overarching Pharmaceutical Quality System then includes Quality Management (QM) and Quality Risk Management (QRM). The latter in turn is defined as 'a systematic process for the assessment, control, communication and review of risks to the quality of the medicinal product. It can be applied both proactively and retrospectively' (p. 8). The principles of QRM are that: 'The evaluation of the risk to quality is based on scientific knowledge, experience with the process and ultimately links to the protection of the patient' and that 'The level of effort, formality and documentation of the quality risk management process is commensurate with the level of risk'. These general definitions, again, still leave Holger (and by extension PADMA) with considerable freedom to devise their own quality system, i.e. PADMA's own practical ontology of quality. Depending on the size and complexity of the company, risks can be assessed in different ways, as Holger explained to me patiently. Mistakes can happen everywhere: human failure, machine problems, everything. The idea is to detect which mistakes can happen where, to analyse their importance, and to minimise their occurrence and impact. It is based on an estimation of mistake prevalence, seriousness, and possibility of detection, requiring intimate familiarity with the processes and products involved. At one point in our conversation, Holger stated that 'quality is everywhere', which prompted me to think of instances that would not be formally covered by the quality system (Audio recording 101). Surely, not

every step of each action in PADMA is laid out in Standard Operating Procedures? GMP relevance turned out to be the crucial category delimiting the formal boundaries of the Pharmaceutical Quality System. Notably, plant raw materials in crude form are not GMP relevant, but are governed by a separate set of regulations (Good Agricultural and Collection Practices) that was implemented fairly recently and is generally less stringent compared to GMP compliance (see also Chapter 2 on sourcing). However, as Holger indicated, reading legislations and guidelines is insufficient to actually know what is to be considered part of the system, part of pharmaceutical quality. Since he is the head of QA and in charge of GMP education, he needs to appeal to a higher authority for his own training. This is where quality definitely expands beyond the company, towards specialised consulting enterprises who organize in-house teaching and workshops on a variety of topics. They are expert at interpreting the regulations and are constantly communicating with the authorities to get it right. A consultant may tell you how to interpret a new guideline, preventing companies from doing unnecessary extra work. Pharmaceutical companies do not act in isolation; they are part of an elaborate network, which helps to communicate and maintain standards.

#### 4.4.2 Quality beyond Padma and Pharma

In a similar vein to the layered aspects of quality already covered – which is rather like opening a set of Russian Matryoshka dolls – I can only offer a glimpse of the construction of pharmaceutical quality beyond PADMA. Needless to say, medical regulations and regulatory authorities external to the company play a definitive role in shaping quality at every level (see Kroes 2014 for a concise overview of the EU legal framework on the quality of herbal medicinal products). This does not mean however that communication and negotiation with authorities and consensus building within the industry do not have an important impact (see Chapter 6).

What happens to PADMA's pharmaceutical quality outside the bounds of the pharmaceutical realm? Medical doctors, pharmacists, Tibetan and complementary medicine practitioners and patients/consumers may define and perceive quality in their

own particular ways. Nonetheless, the political position taken by the biomedical establishment and marketing by pharmaceutical companies strongly influence public perceptions. One of the more prevalent discourses revolves around the opposition of 'Swiss' versus 'Asian quality'. On Padma's website and promotional materials interested parties will find the slogan 'PADMA – Tibetan formulas manufactured in Switzerland'. I asked Herbert, PADMA's CEO, to elaborate (Audio recording 60):

Swiss is a good excuse. I don't want to blame the Asian side actually. I can be cynical, but that is not my real nature. I try to promote the things we do, not talk about what the others don't do or cannot do. It's actually a very nice idea to say Tibetan medicine from Switzerland. To distinguish us from others without saying what others do or don't do. It's like chocolate from Belgium. What is special about this? But definitely chocolate from Belgium and Switzerland is ok, chocolate from Luxemburg. Ok!? We are from Germany, excellent. Music from Austria for example. Not Italian beer. Some countries are connected with certain things.

One can wonder what is actually Swiss about PADMA's products and what is not, ending up in familiar arguments on neo-traditionalism (Pordié 2008a), identity politics (Craig and Adams 2008), 'Tibetanness' (Saxer 2013) and the politics of naming (Hsu 2013). Even though PADMA products do not carry the regulated 'Swissmade' label that is famously used for watches, 'Swissness' clearly remains an asset. What matters most to PADMA however, is to escape scrutiny from the medical community who basically consider products from Asian origins to be unreliable and even dangerous.<sup>65</sup> This prejudice is not often voiced openly, to avoid accusations of discrimination that ought to be absent in today's multicultural and postcolonial societies, but remains palpable also to PADMA in its dealings with the authorities, the medical establishment, and critical customers. On the other hand, the Tibetan aspect is equally emphasised on PADMA products, and can also serve marketing purposes for more alternative-inclined patients. Ontologies of quality and their enactment are entangled with identity politics.

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<sup>65</sup> The quality of Asian herbs on the European market has barely been assessed in a systematic manner (but see van der Valk et al., in press, for a UK survey of Chinese *materia medica* samples consisting of small seeds and fruits). Another recent survey of EU TCM practitioners indicates that the herbs used are generally safe (Williamson et al. 2013). See also Chapter 5, section 5.2.2, on Asian medicine poisoning scandals.

#### 4.5 Men-Tsee-Khang's Quality Assurance Laboratory

In his historical outline of the development of Tibetan medicine in exile, Kloos (2008) highlights the most recent period (2004-present) as being 'revolutionary'. The major events marking this revolution all directly relate to issues of quality. Firstly, the Central Council of Tibetan Medicine (CCTM) was founded to safeguard the traditional standards of Tibetan medicine from unscrupulously profiteering private individuals who were blamed for several incidents following Tibetan medicine's increasing international exposure, and lab results of Tibetan pills with heavy metal concentrations far exceeding European safety norms. Secondly, Dawa's election as Men-Tsee-Khang director and his agenda to introduce GMP and a quality control laboratory to the existing pharmacy constituted a more silent but perhaps even more fundamental change. Kloos (2015) further argues that 'the impotence of tradition' in matters of quality control – due to the vices of the capitalist marketplace – necessitated the help of modern science, which is itself unable to grasp or measure what it is supposed to save (i.e. quality in the traditional sense). A major consequence of these events was a double – yet partial – shift in authority and responsibility: away from Men-Tsee-Khang who is no longer the sole guardian of Sowa Rigpa's reputation, and away from experienced *amchi* as the sole arbitrators of pharmaceutical quality.

In Men-Tsee-Khang's Quality Assurance Laboratory, Phurpu and Norlha are currently the analysts who carry out the large majority of experiments. University graduates in their thirties and married mothers, they both benefitted from sponsored scholarships to pursue academic training in India and abroad (in biochemistry and genetics respectively) before settling down in McLeod Ganj. They were hired firstly by the Herbal Product Research Department (established in 1997), which acquired a small lab in 2002 to ensure the quality of the Sorig healthcare product range in accordance with the Cosmetics Act by the Government of India. The focus was mainly on microbiology, but also included analyses of water content and fatty acids on creams. During my first interview with her at the lab office (Audio recording 73), Phurpu explained how the small HPRD lab merged with another small facility specialised in microscopic plant identification (funded by the Austrian Foreign Ministry as part of Kletter et al.'s (2001) project, previously attached to the herbarium at

the Materia Medica Department<sup>66</sup>) as it was relocated to the current premises behind the iron gates of the pharmacy in 2009. After moving, new instruments were purchased (spectrophotometer, fume hood, vortex, etc.) and from then on quality testing was expanded to include raw materials, herbal products as well as medicines. The influence of CCTM (Men-Tsee-Khang's pharmacy was officially registered 1<sup>st</sup> of July 2010) and AYUSH (since the recognition of Sowa Rigpa in 2011) – which both came after the new lab was properly installed – on actual quality control practices has so far been virtually non-existent. Once every five years there is an inspection, when the license for the Sorig products has to be renewed. Phurpu and Norlha shared with me that this has never raised any problems in the past (Audio recording 87).

Norlha: They are quite impressed.

Jan: I heard this also in the pharmacy, the inspectors are happy.

Norlha: Compared to the Ayurvedic factories, ours is better. Those are very dirty. The maintenance in the lab is quite poor compared to us. A Jogindernagar-based lab also produces some Ayurveda pills. We also visited the lab there. They have quite up-to-date instruments, but the conditions and cleanliness inside the lab...the hygiene. It was very dirty when we visited, that was our first impression. Although they do have high tech instruments like HPTLC.

Jan: You are a centre of excellence! Why if they have better machines, more money, why not higher standards also? Is it due to training or mentality?

Norlha: Maybe different mentality. Those are government-run factories, they are getting funds easily to buy instruments. We also visited a private one in the past two years, but it is very small compared to us. They produce some creams and medicines; it is on the way to Pathankot. [...] On some instruments we can get knowledge from

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<sup>66</sup> Only in 2014 Tenzin Tadzé was hired as a third researcher at Men-Tsee-Khang's lab to continue working on botanical aspects. Tadze (as he is called by friends) recently obtained his BSc in Plant Biology and Biotechnology at Loyola College in Chennai. He works together with Dr Tsultrim from the Materia Medica Department on the botanical identification and microscopic characterisation of selected Tibetan medicinal plants, which is intended to contribute to raw material quality monographs in the future. From the perspective of pharmacy doctors however, there is no real need for this aspect of modern quality control since they can already identify the raw materials in the field and in dried form on the market by using Tibetan and Hindi names. Botanical names seem to be of special interest mainly for doctors interested in disseminating knowledge via books to a wider audience of scientists and Western enthusiasts. See Chapter 1 for more on issues of identification.



them. Like through steam they are preparing decoctions. Steam distillation. That we don't have, it's knowledge we can gain.

Even though the daily operation of QAL is fairly independent from the rest of Men-Tsee-Khang – due to the specialist technical knowhow necessary to really check what they are doing – and from other external influences, the quality of the laboratory is improved through benchmarking with similar Ayurvedic facilities, through exchange of knowledge, and rarely by staff training (for example at the Shriram Institute for Industrial Research in New Delhi, on microbiology). On 5<sup>th</sup> of June 2013 there was also the first official inspection by an AYUSH-representative from Shimla. The inspector was working at the lab mentioned by Norlha, in Jogindernagar. In the lab visitors book he left the following note, indicating that the impact of AYUSH is likely to increase in times to come: 'Excellent facilities coming up. Will be very useful in the future'. Internal communication between the lab and the pharmacy is mainly by a Certificate of Analysis document, which indicates the batch results for all performed tests as well as the WHO limits for the bacterial, fungal (mould), and *E. coli* (faecal contamination) counts. A remark specifies whether the found results are within specification (in case of microbiology only), and if other findings such as alcohol and water extractive value are similar to previous batches or not. A final statement indicates whether the analysed batch is applicable for further use or not. Based on this, decisions are made by the pharmacy doctors on how to proceed. According to the lab's sample registration book covering the financial year 2013-2014 (starting in April), more than 400 samples were analysed during that time.



**Figure 4.3.** The final step in the determination of the alcohol extractive value of *gurgum* (here identified as *Carthamus tinctorius* L.). Norlha is weighing the dish with the dried extract, and Phurpu writes down the result and then calculates the percentage (photograph taken on 23 April 2014).

A full-fledged pharmaceutical quality system (including SOPs, a Qualified Person, and risk analyses, as at PADMA) is not formally implemented at Men-Tsee-Khang, even though the more practical aspects of GMP are mostly carried out. In the lab, the analysts follow in-house protocols and write down the results in logbooks before transferring these into spreadsheets. Since no conventional, scientific Tibetan pharmacopoeia is available (only classical *materia medica* texts and contemporary interpretations), they have to rely on other authoritative publications such as the Ayurvedic Pharmacopoeia and related books published by institutes affiliated to the Government of India (foremostly the *Quality Standards of Indian Medicinal Plants* and *Database on Medicinal Plants in Ayurveda* series). Based on this, Phurpu and Norlha have started constructing uniquely Tibetan quality monographs for all medicines produced at Men-Tsee-Khang. So far, draft monographs have been printed for about thirty commonly used formulas (2010, volume I and II) and eight precious pills have also been covered (2011). Each monograph commences with a

photograph of the medicine and its name in Tibetan, and then describes the average values obtained (no binding limits are specified yet, except for microbiology) for the following list of parameters: description (colour, weight, pill diameter, and hardness), moisture (of powder and pill form), physicochemical tests (total ash, acid and water soluble ash, alcohol and water extractive values), phytochemical constituents (presence/absence of volatile oil, alkaloids, carbohydrates, tannins, and protein), microbiology (total bacterial and fungal counts, *E. coli*), and TLC (under different visualisation and solvent systems, with separation values). In the appendices, the applied materials, methods and calculations are described in detail. When comparing TLC fingerprints from different batches of the same medicine, one can visually observe inter-batch variability (and possibly detect adulteration). Nevertheless, without the use of marker compounds or further quantitative analysis, it is difficult to determine the cause and extent of this variation. Moreover, the phytochemical tests performed at Men-Tsee-Khang are qualitative, making it impossible to detect (and thus standardise) variation in the concentration of what supposedly should be the active compounds. The analysts are well-aware of these limitations, and of the difficulties of analysing multi-compound herbal products. QAL is restricted by a lack of funds in purchasing the necessary chromatographic instrumentation to quantify individual compounds (HPLC, see section 4.3 above), and does not pay external labs to search for heavy metal, aflatoxin, and pesticide contamination. Phurpu summarised what she considered to be currently some of the most important contributions of laboratory quality control (Audio recording 73):

Earlier the Tibetan doctor used to check whether pills were dry or not by crushing them with the teeth. At that time, they didn't have a moisture analyser. Now they are sending samples to us, we actually check the moisture content by using the moisture analyser. We are getting accurate results. Every morning they are giving samples to us, to check whether it is dry or not. [...] Earlier we used to face the problem of fungal contamination, in Tibetan medicine, long back, because they didn't have the moisture analyser. The strength of teeth varies from person to person, it can't give the exact value. They faced a lot of problems. Now it is no longer there. [...] Actually, sometimes we are getting medicine samples from the branch clinics. They are sending the samples to us, [to know] whether the pills are applicable for further use or not. During the course of time, sometimes there may be contamination.

The most radical change compared to pre-laboratory times is the attention to micro-organisms, and how this relates to drying and storage. In these aspects, the laboratory analysts have truly become the new authority since there are clearly defined limits to which the samples must adhere. The creation of quality control monographs adapted to Tibetan medicine is also innovative, but what is even more remarkable is the sensitivity and humbleness with which the analysts have approached the definition of new standards. They are themselves Tibetan, respectful towards Sowa Rigpa, and their power is curbed by experienced pharmacy doctors. Phurpu and Norlha have not merely copied specifications from Chinese or Indian sources (even though in general the results fall within the limits set for Ayurveda), but have been empirically recording the values they obtain at their lab since more than five years. Instead of enforcing unsuitable and rigid definitions of quality, these findings will actually make it possible to attend to the variability inherent to Tibetan medical production at Men-Tsee-Khang. For instance, results show that some pills are inherently less hard or more humid compared to others, and that depending on local weather conditions the moisture content is also significantly affected. If and when the averages obtained will be transformed into limits, care will be taken to make them realistic and feasible, with an underlying rationale as to why the limits were chosen in the first place. QAL's conception of quality is in flux, as is PADMA's.

Coming back to Kloos' (2015) argument, it would be appropriate to describe the introduction of laboratory quality control as part of Men-Tsee-Khang's pharmacy as a 'silent revolution' and not merely as ornamental, or a political tool to prove the scientificity of Sowa Rigpa. I partly disagree however with how this revolution was portrayed by him. Kloos (2015, p. 125) maintains that 'the preservation of Tibetan medicine is nothing but the preservation of its efficacy', that fluctuations in efficacy were deemed problematic by Men-Tsee-Khang doctors (especially when observed in the context of a diabetes clinical trial in 1997), and that modern science had to come in to eradicate this variability between batches through standardisation enforced by a newly installed lab. If it is true that their central concern is 'the standardization of medical efficacy', I do wonder how this can be pulled off by the QAL given the impotence of science to grasp traditional notions of potency of Tibetan formulas. The lab cannot regulate, standardise or even measure the efficacy of

Tibetan medicines diachronically. The ‘standardisation of efficacy’ is a misnomer. Laboratory tests check the identity, purity, and quality of samples, not their efficacy. This is especially the case for Men-Tsee-Khang, where the supposedly ‘active’ compounds are not isolated nor quantified or standardised. Instead, quality is redefined and enacted in practice in specific places and by specific people, rendering obsolete the need to fall back to the reified modern/traditional dichotomy. The analysts at Men-Tsee-Khang’s laboratory have been attuned to the variability in and between medicines, and do not condemn it. Certain aspects of Tibetan medicine might be ‘beyond science’, but that does not mean that people in laboratories haven’t tried their best to close the gap and accommodate these differences by creating hybrid ontologies of quality.

#### 4.6 Qualities in the pluriverse as ontological hybrids

quality, n.

With reference to a thing:

- An attribute, property; a special feature or characteristic  
In early medical use [from the thirteenth century or earlier, in Anglo-Norman] synonymous with humour, n. In ancient and medieval physiology and medicine: any of four fluids of the body (blood, phlegm, cholera, and so-called melancholy or black bile) believed to determine, by their relative proportions and conditions, the state of health and the temperament of a person or animal. In early use also: any of the four qualities (hotness, coldness, dryness, and moistness) believed to be associated with these
- Originally: the nature, kind, or character (*of* something). Later [seventeenth century onwards, initially with reference to merchandise]: the standard or nature of something as measured against other things of a similar kind; the degree of excellence possessed by a thing.

Compare quantity, n., with which the word is frequently contrasted.

Adapted from the online Oxford English Dictionary, Third Edition

The abridged dictionary excerpt above indicates that in English vernacular language the meaning of the noun ‘quality’ in relation to things has shifted from denoting an essential property or character (as in medieval humoral medicine), towards an inherently

comparative as well as measurable concept carrying with it a clear value judgement (originally in an economic sense): good or bad quality of goods. What is quality? Laboratory analysts directed me towards state pharmacopoeias and in-house monographs that provide a set of parameters and specifications (often in the form of limits) to be upheld. In this respect, quality can be said to be measurable both by qualitative and quantitative means. By various tests and with the help of analytical equipment, ingredients and compounds are identified, their purity checked, and important active or marker compounds determined in assays (quality in the narrowest sense). These quality control methods are not only inherently comparative, relying on chemical standards or reference samples as a baseline, but they also visualise only a tiny window within the physicochemical spectrum that constitutes complex multi-compound and multi-ingredient mixtures. This quality concept is clearly not all-encompassing. Many aspects will remain unknown or even unknowable, even to modern science. The question then becomes what has to be controlled legally. What is actually checked, but more pressingly: what is not? To what extent can quality control capture or (mis)represent the nature of medical substances?

For the Qualified Person, who holds the final (and juridical) responsibility for the safety, quality, and efficacy of products released on the market by a pharmaceutical company, these questions are equally pertinent. This person has the power to decide based on the data available and their own knowledge and experience: a meta-assessment or qualification of the quality controls. Market-releasable quality then becomes a semi-subjective decision where trust in the analysts and techniques involved as well as a consideration of risk are brought to the fore. We enter the domain of the Quality Assurance Officer, whose activities of risk analysis, management and mitigation span across all departments and beyond. From general health and safety measures, over staff education on proper cleaning, maintenance, and documentation, to external inspections of suppliers. The quality of Quality Assurance is everywhere. It is a system designed to reduce all sorts of risks for consumer/patients, staff, as well as potential economic losses. Yet quality can be traced even further outside of the lab and the company and its supply chain within the pharmaceutical production realm. Not merely because of the existence of other industrial Good Practices (GxPs) like GACP (Good Agricultural and Collection Practices), GDP (Good

Distribution Practices), GVP (Good Pharmacovigilance Practices), and so on, but more fundamentally because of the wider networks of competition, exchange, training, and joint consensus and policy building in which suppliers, producers, consultants, and state departments are involved. Quality at any of these levels cannot be interpreted or (re)defined in isolation. Pharmaceutical quality is an amalgam of multiple concepts, it is multi-layered but also cross-cutting and reaches far beyond legally binding documents. In short, abstract 'quality' is unknowable even to laboratory science.

Quality as such is not an isolated concept. This is the article my wife wrote in this journal (Schwabl and Gämperle, 2013). There is not a single test, it is a concept. GMP is a concept. It is never the measurement. Every single measurement is needed for establishing the quality, but not in a way that you do one measurement and then have established everything. How you purchase, do you know the people, do you know the methods, apply them in a regular way, which methods. A cascade of different events. This establishes quality. You cannot measure quality as such. You cannot therefore simply say they do five tests and then you have the quality. It is also risk-based; first you have to make an analysis of the risks. It's a risk analysis. What are the potential risks you have with a certain ingredient or process? A better risk analysis gives a better concept. Just doing measurements because one is obliged to do it is most stupid, it's how they do it in China. As you know from analytics, you only find that what you are looking for. 'Is there no pesticide inside?' From a scientific point of view this is an unanswerable question, first define what is a pesticide. On a worldwide list there might be hundreds or thousands of different chemical substances. One can only look for the most prominent ones. Who will pay for looking for the strangest molecules? [...] The [European] Pharmacopoeia prescribes certain analytical methods, but you have to validate the method. You have to challenge your method. You cannot just buy a kit at Merck and do one test and say 'I didn't find anything'. That is again useless. PADMA is embedded in an environment. It [i.e. quality] is a machinery. The simple answer to 'do you do this test?' is: 'yes, we do'. [But] [y]ou have to understand the concept. (Herbert Schwabl, 9 July 2013, Audio recording 9)

What about 'quality' in Tibetan medicine? Firstly, this word is commonly used in English translations of Tibetan pharmacological categories such as *nüpa gyé* (the eight powers or types of potency of medicines, sometimes called primary qualities), *yönten chudün* (the seventeen attributes or secondary qualities), and *ngowo* (the essence or natural quality of

a specific substance) (see for instance Drungtso and Drungtso 2005, Gonpo 2008). Quality refers here to certain inalienable characteristics of objects, corresponding to the older, humoral dictionary definition introduced above. Secondly, when mentioning GMP to Men-Tsee-Khang doctors involved in the production of medicines, they will point out that *Gyüdshi* (volume IV, chapter 12) contains its own guidelines to ensure that (particularly herbal) medicines have the optimal qualities: *yenlak dün*, sometimes rendered by *amchi* as the *Seven essential limbs of standardisation*. GMP and *yenlak dün* can correspond, or at least do not necessarily exclude or contradict one another (as elaborated by Saxer 2013).<sup>67</sup> Thirdly, *Gyüdshi* (volume II, chapter 31) also enumerates the six qualities (or prerequisites) of eminent physicians, which are founded on Mahayana Buddhist ethics. As I have indicated, Kloos (2015) argues that Tibetan medicine's exposure to clinical trials and the vices of the marketplace instigated the need for laboratory quality control at Men-Tsee-Khang as Buddhist ethics and textual ideals proved incapacitated. This credible standardisation discourse notwithstanding, I showed that what is actually taking place in the QAL does not greatly increase the homogeneity within or between batches of medicine – so far variability is merely documented, not erased – except in terms of moisture content and microbial counts. Similarly, when dealing with complex processed plant-mineral assemblages that are not fully knowable scientifically, standardisation at PADMA is not a matter of fact but a matter of degree where the compliance of each batch has to be risk-assessed individually before being released onto the market. Men-Tsee-Khang only started formally assessing its medicines using modern laboratory standards in 2009, but this is still secondary to the traditional checks and the final decisions are still taken by Tibetan doctors. It seems that both companies adhere to the idea of complementarity, while disagreeing on priorities. By paying attention to what happens inside (the labs of) firms as part of more encompassing reformulation regimes (as suggested by Pordié and Gaudillière 2014a) through a practical ontological lens, I was able to tease out dissonances between narratives and actions as well as question the reification of 'theory' versus 'practice'.

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<sup>67</sup> The Tibetan Seven Limbs procedure is comparable to the Chinese medical quality concept of *dao di*, defined by Zhao et al. (2012, p. 476) as 'medicinal material that is produced and assembled in specific geographic regions with designated natural conditions and ecological environment, with particular attention to cultivation technique, harvesting and processing'.



Geoffrey Samuel (2006) suggests that it is useful to make a general distinction between practical medical situations on the one hand and concerns about theoretical and epistemological underpinnings on the other when considering the interface of Asian scholarly medical traditions with biomedicine. The former are characterised by hybridity in presentation and practice, medical pluralism and pragmatic decisions by patients and practitioners, whereas paradigmatic conflicts more often surface when politics of (il)legitimation are mobilised (as epitomised in clinical trials; see Adams 2002, Adams et al. 2005, Witt et al. 2012 for Sowa Rigpa). Although analytically satisfying, I contend that this distinction conceals that the performance of hybrid knowing practices (Farquhar 1994) distorts their conceptual underpinnings, even if *the Four Tantras* are ostensibly unaltered. Coming from a posthuman ontographic perspective and following Jensen (2004), ways of knowing are instantaneously seen as specific ways of constructing realities, collapsing epistemology into the enactment of practical ontologies. Quality control is not a mere act of observation or representation of inherent qualities in comparison to idealised references, but rather a localised intervention that builds on relations with new sociotechnical elements. I am sympathetic to Adams et al.'s (2011b) 'Sowa Rigpa sensibility' which reveals the translation efforts that may lead to 'a culturally Tibetan way of *doing science*' (ibid., p. 23), mapping the multidirectional flows of ideas and practices and their local adaptations from the epistemological perspective of Tibetan medicine. But again, even though this statement grants agency to medical practitioners (who are not present in the labs) this perspective cannot incorporate or explain the hybrid qualities I came across at Men-Tsee-Khang and PADMA. What quality and (Tibetan) science *is*, is itself transformed by laboratory practices, reconfiguring (Tibetan) onto-epistemologies and knowledge/practice. Adopting a constructivist-relativist epistemology which espouses fundamental incommensurability, some scholars of Chinese medicine have rejected the application of biomedical standards as flawed reductionism (Fan 2003, Fan and Holliday 2007). In her literature review on this topic, however, Shea (2006) maintains that adopting dual standards is an unrealistic alternative in today's regulatory reality. The perceived difference between these systems is exaggerated and based on an oversimplification of 'traditional Chinese medicine' (based on Scheid 2002, see also Samuel 2006 for Sowa Rigpa). Recognising the plurality, emergent syntheses of knowing practice (Scheid 2002) as well as the alternative modernities (Hsu 2009) and transnational 'worlding' (Zhan 2009) of Asian

medicines, the production of good quality Tibetan medicines can be understood as more than either a pharmaceutical or Tibetan medical endeavour.

PADMA and Men-Tsee-Khang's labs are places where pharmaceutical and Tibetan qualities intersect and mingle. Following Ganguly (2012), scientific experts and their knowledge-about-quality are clearly privileged over 'traditional' practitioners and practices in any laboratory setting. But that is not the end of the story. In making quality measurable in the lab, we have to attend to what is actually being measured and what this is supposed to stand for. What is quality? This is where an ontographical approach proves fruitful. PADMA and Men-Tsee-Khang are involved in the creation of local, practical ontologies of quality. In rendering these efforts into ethnography, I have aimed to implement Lynch's (2013) ontography approach. However, even though particular constructions of quality can be situated within these laboratories and historicised, I also show that ideas and practices can travel. Thus, the ontological frameworks I observed are not only locally anchored, but also fluid and in partial overlap with other ontologies. There is an ongoing struggle to increase the partial overlap between pharmaceutical science and Sowa Rigpa, wherein standardisation plays a central role. Nevertheless, notions of quality do not remain fixed. They never have. The presumably independent, reified 'modern' and 'traditional' quality standards are themselves intercultural to begin with as they are constantly reinterpreted and re-enacted in specific spatiotemporal and sociopolitical contexts, often by people who are conscious but careful neo-traditionalists (see Pordié 2008, p. 9-19, for its characteristics and application to Tibetan medicine). Surely, heavy contamination with pesticides cannot be condoned by even the staunchest traditionalist *amchi*, once they have been made aware of the problem. Does this then count as a new ontology of quality, or a modification of a much older one based on compassion? I would say it's in the mix. The boundaries of ontological frames are fluid and therefore hybrid. Quality is continuously redefined and hopefully reinvigorated at and in-between PADMA and Men-Tsee-Khang as they rework the interface between differing scientific ontologies, creating uniquely Tibetan alternative modernities as suggested by Kloos (2015).

PART III

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MEDICINES

## 5 Garuda-5: ecologies of toxicity and the poison- medicine spectrum

My attention was initially drawn to Garuda-5 by coincidence. I came across the unmistakable shiny, little black pills known in Tibetan as *khyung-nga* while assisting in some manual work at Men-Tsee-Khang's Pharmaceutical Department on a sunny Monday morning (Diary, 14 April 2014). *Amchi* Tenzin Thaye and Penpa were at their office, and several junior doctors were also there chatting. I asked Penpa, my main contact here appointed by the Director, what was going on at the moment and was accompanied to the packaging section. I was introduced to two middle-aged Tibetan women and a young Tibetan man with a single Tibetan sentence. Penpa left, and the young Tibetan guy called Karma, whose English was very good, helped me to start. I first needed a square cushion to sit on the floor around the blanket on which thousands of tiny black pills were piled up. I put the blanket over my knees and lap, and was given one of the ingeniously designed pill counting tools made of stainless steel (Figure 5.1). Karma said some doctors had once instructed them to test the potency of the Garuda-5 pills by keeping them in their mouth. Trying a few together, several workers felt a burning sensation and some also dizziness. Before he came here, Karma did not have much knowledge of Tibetan medicine. Now that he knows more about how the medicines are made, he has more faith in their effect.



Figure 5.1. Counting Garuda-5 (*khyung-nga*) pills together in the packaging section of Men-Tsee-Khang's Pharmaceutical Department (14 April 2014). 634 kg was compounded on February 27<sup>th</sup> and stored in more than ten large bags. It will take up to four or five months of work – in between other jobs – to count all of these pills because they are so small.

This chapter revolves around one Tibetan medical formula that is produced by both Men-Tsee-Khang and PADMA: Garuda-5 (*khyung-nga*). This medicine's efficacy is due in large part to a particularly potent medicinal plant variously called 'black aconite' (*bongnak*), 'virulent poison' (*tsenduk*) or 'the great medicine' (*menchen*) and equated with a variety of *Aconitum* species. Its strong potency, however, is potentially dangerous or even deadly. How can these poisonous plants be used in medicine, or conversely: when does a medicine become a poison? How can ostensibly the same substance be both harmful and helpful? These questions beg a more nuanced explanation than mere dose-dependency. 'The dose makes the poison'<sup>68</sup> is the famous adage formulated by the sixteenth-century scholar

<sup>68</sup> *'Sola dosis facit venenum'*, or in the German translation: *'Alle Dinge sind Gift und nichts ist ohne Gift, allein die Dosis macht es, dass ein Ding kein Gift ist.'* (Paracelsus 1538, p. 510). The universal validity of this tenet is also increasingly being challenged by toxicologists, particularly in the light of the chronic toxicity of endocrine-disrupting contaminants, which turns out not to be predictable based on dose-response curves (Myers et al.

Paracelsus (1493-1541) whose ideas lie at the foundation of modern toxicology. Dosage does play a vital role in the biomedical evaluation of toxicity, and in the formulation and prescription of Tibetan medicines, as will be shown below. Yet I argue that attending to the broader 'ecologies of toxicity' in which these are enmeshed, in line with Sienna Craig's (2012) *Efficacy and the Social Ecologies of Tibetan Medicine*, provides fertile ground for better understanding the variable effects of *khyung-nga* and of potent substances in general. I aim to unpack the opposition between *men* and *duk* in Sowa Rigpa by elucidating the multiple and partially overlapping dimensions which determine the activity of the Garuda-5 formula. I thus expand Craig's approach to include the full spectrum of potency – the 'good' and the 'bad', the 'wanted' and the 'unwanted' – without presuming the universal validity of biomedical notions of toxicity, side effects and risk, by turning to anthropological conceptions of the body.

Medical anthropologist Margaret Lock (1993) coined the term 'local biologies' in her seminal comparative ethnography on American and Japanese understandings and lived experiences of menopause. With this, Lock sought to prevent Euro-American hegemonic biomedical discourse from marginalising Japanese women's bodies as anomalous exotica and to challenge the medicalisation of the end of menstruation. Moving beyond the narrow purview of ethnomedicine as well as meaning-centred analyses, Lock saw the need early on to transcend the nature/culture dichotomy and to question the epistemologically untouchable position of both the human body and the medical sciences as 'natural' categories. In a later review of the development of medical anthropology she summarised this key concept as follows:

[It] does not refer to the idea that the categories of the biological sciences are historically and culturally constructed (although this is indeed the case) nor to measurable biological difference across human populations. Rather, local biologies refers to the way in which the embodied experience of physical sensations, including those of well-being, health, illness, and so on, is in part informed by the material body, itself contingent on evolutionary, environmental, and individual variables. [...] In other words, the biological and the social are

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2009). Other research points out that timing is also a crucial factor in the metabolism and detoxification of drugs (Gachon and Firsov 2011).

coproduced and dialectically reproduced, and the primary site where this engagement takes place is the subjectively experienced, socialized body. [...] The material and the social are both contingent – both local. (Lock 2001, p. 483-484)

Local biologies are embodied, contingent, and coproduced, simultaneously steering clear of the essentialising extremes of genetic determinism and cultural constructivism of our bodies and the impinging medical practices. Lock and Farquhar (2007) expanded on this by setting the agenda for an anthropology of embodiment and material life *Beyond the Body Proper*, beyond the object-body as the lesser pole of Cartesian mind-body dualism. Instead and inspired by phenomenology, everyday lived and socialised bodies take centre stage. More recently, Brotherton and Nguyen (2013) specified the usefulness of this approach: biology (and biomedicine) can be taken seriously – not merely as representation or ideology – necessitating ethnographic sensitivity to the lived experiences of people, which in turn makes it possible to subvert dominating paradigms through critical engagement. This is also the approach of this chapter, and the multi-sited nature of this thesis equally parallels Lock's pioneering work.

I am certainly not the first to pay attention to the import of local biology and lived bodies for Asian scholarly medicines. In the section on colonised bodies of Lock and Farquhar's volume – whose work has itself focused on Japanese and Chinese traditions respectively – Jean Langford discusses how doctors in contemporary Ayurvedic hospitals both work with and contest the disciplined, *docile* modern anatomical body, allowing for moments of slippage in which the *dosic* body overflows somatic borderlines. This dosic body is

a fluent body, coursing with climates and appetites, messages and passions, winds and tempers. The dosic body spans the divide between text and world. It is inscribed with signs that are more productively understood as versatile signifiers than visualized as definite objects. To say that it is a fluent body is to say that it is overflowing not only with dosic currents, but also with polyvalent syntax. (Langford 2007, p. 376)

Similarly, alternative and multiple medico-religious bodies have been identified also in Tibetan societies (Adams 1992, Garrett 2008, Gyatso 2015). These embodiments, however, mostly pertain to (discourses about) the social body and/or the body politic (cf. Scheper-Hughes and Lock 1987). My investigations, however, also articulate well with Hsu's

addition of the ‘body ecologic’ as another approach to theorise the body. In her genealogy of the five elemental agents of contemporary Chinese medicine, Hsu traces how ecological realities come to be encapsulated in concepts of learned medical reasoning. In doing so she insists that ‘those interested in how biology is contained in culture have to turn to history’ (Hsu 2007, p. 122). Craig (2012) employs ‘social ecologies’ to map the multiple ways in which human-environment interdependencies shape the efficacy of Tibetan medicine in her multi-sited ethnography in Nepal and Tibetan areas in China. She defines efficacy<sup>69</sup> as:

[...] produced at the intersections of ritual action and pharmacology, within distinct social ecologies. Efficacy is a measurement of micropolitical power, biopsychosocial effects, and cultural affect. It is an intersubjective phenomenon, by which I mean that one cannot really know whether a medicine or therapeutic approach is efficacious until a practitioner makes and/or prescribes it, a patient uses it, and then reacts to its use. (Craig 2012, p. 7)

I subscribe to this nuanced definition, which recognises the medico-pharmacological-ritual nexus and its social, sensorial and material embodiment. But academic coverage of Buddhist and medical perspectives on suffering and healing – evoking the (dis)balance of the three emotional poisons (*duk sum*) and their corresponding psycho-physical forces or ‘humours’ (*nyépa*) – and of the principles of Tibetan pharmacology has remained limited to literal translations and interpretations of a few classics. Building on these pioneering studies which elaborate the principles of medicine compounding (elements, tastes and post-digestive tastes, potencies, and attributes; Cardi 2005-2006, Hofer 2014, Tsultrim Tsona and Dakpa 2009), I contend that there is still a lack of ethnographic and text-critical attention to the material flows and frictions that make up the efficacy of potent substances.

The explanation of efficacy has long tantalised scholars across the range of academic disciplines contributing to the medical humanities and biomedical sciences. From symbolic, constructivist approaches and meaning-centred analyses – such as Moerman’s (2002) rendering of the placebo effect as ‘the meaning response’ – on the one end to materialist causality and neuro-reductionism on the other, the role of materiality has often either been ignored or equated with physicochemical reactions. The study of the efficacy of ‘indigenous’

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<sup>69</sup> As Craig (2012) notes, the most common Tibetan translation for efficacy is *phenü*. This is a contraction of the words for benefit (*phenthok*) and potency (*nüpa*), effectively coupling the useful with the powerful.



healing and 'traditional' medicine in particular has proven problematic for medical anthropologists on both theoretical and methodological levels as they struggle with Eurocentric and biomedical biases, issues of authority (differing stakeholder perspectives), and the disentanglement of preventative and therapeutic efficacy, proximate and ultimate effects, restorative versus transformative healing and the food/medicine dichotomy (Etkin 1988, 2006; Waldram 2000, 2013). In light of the abovementioned studies, I find it useful to expand Lock's concept of local biologies and Craig's social ecologies of efficacy into 'ecologies of toxicity' for the purpose of my argument. There is an inextricable link between medical efficacy and toxicity, which I aim to show by emphasising the often-ignored metaphorical flipside of the potency of *materia medica*. Conceiving the body ecologically as a dynamic microcosm based on and overflowing in the local environmental macrocosm, I argue that medical toxicity emerges in particular bodily configurations which in turn implies that the poison/medicine dichotomy is in effect a spectrum of possibilities constrained by local interactions.

These sensitivities notwithstanding, the deployment and contestation of the biomedical notions of 'risk' and 'side effect' plays a crucial role in what follows. Ethnopharmacologist Nina Etkin (1992) critically analysed the reductionist biomedical definition of 'side effects' and how these effects are interpreted and employed in unexpected ways in various sociocultural realities, in Etkin's example the indigenisation of pharmaceuticals by the Hausa of rural northern Nigeria. She argues that 'the primacy or subordination of effects depends on why a medicine is administered, the intentions of the user and prescriber, and the anticipated outcome – in short, its cultural context' (Etkin 1992, p. 102). Contrary to the general opinion, traditional medical systems relying mainly on a pharmacopoeia of plants are markedly sensitive to a multiplicity of effects. Indeed, as plant-based medicines are complex mixtures to which multiple benefits are often ascribed, one would logically expect there to be more 'secondary' effects as well. Healers thrive on their awareness of this complex chemical ecology (see also Johns 1996) far removed from the unrealistic one-dimensional efficacy/toxicity or main/side effect of highly concentrated pharmaceutical molecules. The myth that pharmaceuticals have both a stronger efficacy as well as less side effects belies their sociocultural and biological complexity as secondary effects are

relegated to a post-marketing rhetoric of 'noncompliance' and 'misuse', masking what are often purposeful appropriations.

Etkin's astute observations have been corroborated and expanded more recently by historians, social scientists and anthropologists working on scientific, biomedical and regulatory conceptions of risk and safety. Marks (2013) contends that adverse drug reactions are a long-standing controversy that emerged with the rise of modern therapeutics. He argues that the foundation of the US drug regulatory system and the Food and Drug Administration (FDA) on the 1938 Drug Law was premised on the maintenance of professional medical autonomy at all costs. Drug labelling in the form of safety data and therapeutic claims is regulated, but not prescription itself, largely limiting regulation to information management. Within an ideological and political climate in which the industry invokes the autonomy of physicians, freedom, innovation and medical need as inviolable principles, making the risks of adverse reactions visible is problematic. Over the years, the basic toxicological and statistical dilemma has nonetheless remained the same: many effects only appear when present in a large number of patients (with complications more common in the study population requiring bigger samples), and interpreting the strength of association and causal drug-effect relationships is difficult and clearly does not indicate directly how best to regulate. Since World War II and in the wake of the 1960s Thalidomide disaster in Western Germany and beyond, the pharmaceutical industry has become perhaps the most stringently regulated economic sector. Nonetheless, drug safety has remained a clinically uncertain, politically contested moving target.

An extra problematic layer of contingency is added when these biomedical safety standards are globally and uniformly applied to 'traditional medicine' as defined by the World Health Organization (with its headquarters in Geneva). As Kadetz (2015a) convincingly shows, the WHO's current normative safety discourse was consecutively shaped by the expansion of biomedical hegemony in the US from the nineteenth century onwards, and the international dissemination of scientific medicine through the Rockefeller Foundation and other philanthropies along with American capitalism and political-economic, technocratic

ideologies. Heavily funded long-term projects in China from 1914 onwards professionalised American medicine there, installed newly educated elites in government health institutions, and eventually contributed to the integration of the recently reinvented 'Traditional Chinese Medicine' under a biomedically-dominated hierarchical paradigm. In the 1990s the WHO's Traditional Medicines Unit was moved under the Essential Medicines Division, which led to a further shift from primary healthcare towards economic efficiency and commodification as reflected in WHO publications on Good Agricultural and Collection Practices, Good Manufacturing Practices, herbal quality control guidelines and pharmacovigilance. Based on his long-term fieldwork in the rural Philippines and at the WHO Western Pacific Regional Office, Kadetz (2015b) further problematises the universality of 'safety' as applied to plant-based medicines by revealing three flawed assumptions: the paternalistic assumption that safety is an issue for people in their local healthcare practices, the ethnocentric idea that biomedical constructions of safety are shared by all, and another paternalistic assumption that a person cannot her/himself decide whether a treatment is beneficial or not. He further notes the disparity between global WHO standards and the realities of state and local implementation which often seems to marginalise local practitioners in exchange for the profits of commodification (as in Adams 2002). Arguing for a reframing of the discourse and regulation of herbal medicines, he observes that

the global commodification of plant-based health care products has been justified as the means by which to prove and improve the intrinsic effectiveness, quality and especially safety of the plants intended for human health, [... but paradoxically] the extrinsic factors of production, marketing and regulation of these plants may raise more significant concerns of safety. (Kadetz 2015b, p. 115)

Medical anthropologist Barbara Gerke's ongoing work is at the forefront of nuanced socio-cultural research on toxicity in Tibetan medicine. A three-year project on pharmacological detoxification methods with practitioners in India and Nepal led her to investigate *The Social Life of Tsetel* (Gerke 2013), a highly processed and expensive mercury sulphide compound considered to be 'the pinnacle of Tibetan pharmacology' (p. 123) as an essential ingredient for several of the most complex, potent, and popular Tibetan medicines named

'precious' or 'jewel pills' (*rinchen rilbu*). Gerke describes a dilemma faced by the Tibetan medical community: *tsothel* is variously perceived as the supreme medicinal substance or as the most dangerous neurotoxin, implicated in Asian medical product poisoning schandals. Practitioners and institutions are thus challenged to prove its safety, whereas Tibetans have no doubts on its benefits and are keenly aware of mercury's toxicity in unprocessed form. This focal shift from efficacy to safety was noticed by Gerke (2015) as a more general trend in the biomedical and regulatory literatures which has hitherto not been taken on by pharmaceutical anthropologists (except in the recent work of Kadetz, cited above). Within medical anthropology, discourses of harm reduction, prevention and risk have been found to reinforce prejudice towards marginalised groups under the guise of scientific objectivity, engendering complex dynamics and politics of responsibility. The pharmaceutical industry furthermore feeds (on) the creation of health anxieties through the marketing and sale of medical solutions, fueling (bio)medicalisation (Nichter and Lock 2002). In a similar vein, I am sensitive to how biomedical notions of risk can be mobilised to condemn 'foreign' medicines in this chapter through the conception of hazardous entities.

Under the next heading, I trace the mythological origins of aconite and Garuda-5 and their appearance in classical medical texts, to then arrive at their contemporary use in and as medicine. This not only presents the broader textual-historical framework for explanations of toxicity and efficacy but also links it to contemporary medicine making, pinpointing transformations in practice. The remainder of the chapter is divided into two larger parts that cover the manifestations of Garuda-5 at PADMA and Men-Tsee-Khang respectively, bringing several dimensions of its ecologies of toxicity to the fore. The latter institution deserves extra attention in this chapter since it provided me with crucial insights into the possibly dramatic consequences of not being sensitive to local biologies and ecologies, to the controversial role of detoxification in dealing with this variability, and to the deployment of Garuda-5 in the clinic.

## 5.1 From myths to pharmaceutical realities

Scratching the surface of the etymology of the Latin scientific name *Aconitum napellus* L. (PADMA's identification of *tsenduk*) brings us directly to its Greco-Roman mythological origins. *Aconitum* or aconite may simply be derived from 'aconae' (Latin for 'barren rock' or 'mountain') according to Pliny the Elder (77 CE, *Naturalis Historia* XXVII, II), or could alternatively refer to the Akóne (a coastal city of the Black Sea). Akóne lies near to the entrance to the Underworld, from where Hercules brought forth the hellhound Cerberus. Upon witnessing the sun, the creature howled ferociously. From its saliva that touched the earth, aconite sprouted. The mundane epithet 'napellus' likely refers to the turnip-like roots (Stern 2004). A not too dissimilar Scandinavian myth explains the Nordic names for this plant referring to the Gods of thunder and war (as 'hat/helm of Thor/Tyr'). The voracious wolf Fenris was chained to two rocks in Asgard by Tyr, but it managed to tear itself loose during the demise of the heavenly realm. Thor battled the wolf while simultaneously fighting the poisonous snake Joermungan. As he slayed the viper, Thor also perished by its toxic breath. Thor's son Widar then avenged his father, slaying the wolf by thrusting his sword deep between Fenris' jaws; piercing his heart. From that day onwards, 'Thor's hood' (i.e. aconite) wreaks death and destruction amongst wolves. This is reflected also in the English name wolfsbane, and in the historical application of meat drenched in aconite extract as poisoned bait to kill wolves (De Cleene and Lejeune 2003).

It seems that *Aconitum* species equally play a role in the Indian mythical origins of naturally occurring poisons. Three alternative accounts are depicted and summarized in Parfionovitch et al.'s *Tibetan Medical Paintings* (volume 1, p. 117-118, see Figure 5.2).<sup>70</sup> In the first, various types of aconite are said to be derived from the shattered body of Poison Incarnate, who was vanquished by the Hindu Gods in their search for the nectar of immortality. Another myth recounts the origins of the medications that suppress poison as derived from some of the nectar scattered on the earth by Maheśvara. Interestingly, the

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<sup>70</sup> The production of this seventeenth-century encyclopaedic set of seventy-nine *thangka* scroll paintings was commissioned and overseen by Dési Sangyé Gyatso (1653-1705, the chief minister and regent of the Fifth Dalai Lama). It was based on his comprehensive written commentary (*the Blue Beryl*) on the *Fourfold Treatise*, and is a testimony of state investment in and control of medical learning (see Gyatso 2015).

same connection between aconite, poisoning, and wolves is also expressed in the Tibetan plant name *changduk* (lit. 'wolf poison'). This herb is illustrated as an exemplar of the naturally occurring, organic, immobile poisons derived from plants in *Tibetan medical paintings* (and identified there as *A. lycoctonum* L.), in between *tsenduk* ('virulent poison', *A. fischeri*) and *raduk* ('goat poison', goatsbane or blue aconite, *A. napellus*). As we have seen in Chapter 1, the botanical identification of aconite in Tibetan medicine is complex and problematic.



Figure 5.2. This upper section of the fifty-first painting from Parfionovitch et al. (1992, p. 117) depicts the origins of natural poisons according to Indian mythology. The large, red creature in the centre is *kālakuṣa* or *hālahala*, Poison Incarnate, who was destroyed and whose body was shattered by Brahma and the other Gods upon invoking the syllable Hūṃ. On the right, several poisonous substances derived from poison incarnate are illustrated.

Moving on from aconite as an ingredient towards Garuda-5 as a formula, Gyatso and Hakim (2010) present a convenient summary of a legend narrating its origins:

There was once a kingdom in eastern India whose inhabitants were bothered by lymph (*chuser*) disorders and diseases caused by *klu* (subterranean or aquatic elemental spirits) and by

microorganisms; it was possibly leprosy. Not knowing where to turn, the king and his subjects took refuge in the Three Jewels (Buddha, dharma, and sangha). As a result of this observance, Garuda (a mythical bird) manifested to help the kingdom and cleared away the obstacles faced by the people. When he was about to die, Garuda offered his body as medicine so that the people could continue to enjoy his blessings in the form of pills to be taken internally or worn as amulets. Garuda further promised that when the materials of his body were exhausted, his blessings would continue in the form of drugs. Thus it is said that *a ru ra* (chebulic myrobalan) symbolizes Garuda's flesh, *ru rta* (costus) symbolizes Garuda's bones, *shu dag nag po* (sweet flag) symbolizes Garuda's muscles, *gla rtsi* (musk) symbolizes Garuda's blood, and *bonga nakpo* (dark-blue aconite) symbolizes Garuda's heart.

(Gyatso and Hakim 2010, p. 317)

The five ingredients of Garuda-5 correspond to the Garuda's body parts. Myrobalan is mentioned first as the main ingredient (as the flesh would be the heaviest part), whereas aconite represents the heart of this mythical bird.<sup>71</sup> *Khyung-nga* is mentioned sparingly in the *Three Tantras*, excluding the large and hitherto untranslated *Third Tantra* on pathology. At the beginning of chapter 28 of the *Second Tantra* on specific therapeutic techniques (Clark 1995) '*bya khyung Inga (pa)*' is suggested in case the practitioner has doubts concerning the diagnosis when presented with symptoms of infection, parasites, or stomach and large intestine disorders. The compound may then be prescribed as a probe or trial to which the response will help ascertain the nature of the disease. In chapter 5 of the *Subsequent (Fourth) Tantra* on the subject of pills (*rilbu*), Garuda-5 and its ingredients are listed once more (Gonpo 2011, p. 91). Here, the compound is advised as a basis to cure cold disorders to which supplementary ingredients can be added to target specific organs and pathologies. The dosage is according to the need, but five, seven or nine pills at dusk are suggested. Its common usage, however, springs from its relatively frequent occurrence in the *Third Tantra*, from which Garuda-5's beneficial qualities or virtues (*phenyön*) may be summarised as follows (translated from Tsering 2013, which is memorized by fourth year medical students at Men-Tsee-Khang): treats severe stomach pain, inflammation of the head (including ears, nose, and gums), pain due to intestinal parasites (*sin*), tonsillitis,

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<sup>71</sup> The Garuda (Tibetan: *khyung*) is a popular mythical creature in both Hindu and Buddhist traditions which later merged with the Bonpo 'sky-soarer' in Tibet. This king of birds has the torso of a man and holds a *naga* (serpent) king between his hands and sharp beak. In Tibetan Buddhist iconography, the Garuda assumes multiple roles (Beer 2003).

itching and cracking skin, and is particularly excellent against leprosy and ‘yellow fluid’ (*chuser*) disorders. Its potency is neutral, and the mode of administration mentioned here is four pills taken together with boiled water.

Following Blaikie (2015) and my argument on situated knowledge in Chapter 1, the multiplicity of the composition (and dose) of Garuda-5 should not come as a surprise. Nonetheless, when comparing the small number of English-language publications detailing Tibetan formulations, then it seems that the variation is relatively minor. Dash (1994)<sup>72</sup>, an Ayurvedic scholar-physician, Phuntsog (2006), a lineage-based Ladakhi *amchi*, and Tsarong (1986), Tibetan exile and former Men-Tsee-Khang director, basically agree on the formula. This may be due to the standardising effects of the Four Tantras as well as the widespread usage of Khyenrab Norbu’s (2007, originally early 20th century) *Excellent Vase of Elixirs* (*Düdtshi Bumzang*) – a foremost reference for both Lhasa and Dharamsala pharmacists and beyond, especially on ingredient quantities which are seldom published (Table 5.1). Yet, when one then compares these paper formulas with the actualised compositions of Garuda-5 by Men-Tsee-Khang and PADMA, a different story emerges (Table 5.2). Nowadays at Men-Tsee-Khang’s pharmacy, the amount of aconite is generally much lower (from 25% to less than 10% of the total weight in this case), and musk (*latsi*) is commonly substituted by the resin of *gulnak* (the black type of *gugul*, mostly identified as *Commiphora wightii* (Arn.) Bhandari and well-known for its use in Indian dhoop incense).<sup>73</sup> The pills are given a black coating. PADMA’s *Grippe-Formel* deviates much further from the purported standard: it contains only three of the ‘original’ compounds (costus, myrobalan, and aconite), six other ingredients, as well as excipients. Here, aconite accounts for only 1,4% of the formula.

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<sup>72</sup> Dash (1994, p. 11-12) warns the reader that *tsenduk* (which he considers to be a type of the Ayurvedic *Vatsnābha*) is exceedingly poisonous, and that it should be detoxified before use, which involves prolonged soaking in cow urine until the purified aconite does not produce tingling sensations or numbness on the tongue. Khyenrab Norbu (in his *Excellent Vase of Elixirs*) on the other hand advises soaking in eight-year-old child's urine for three days.

<sup>73</sup> Substitutions across kinds and kingdoms are not uncommon in Sowa Rigpa (Gerke 2016 in press, Sabernig 2011), and are not easy to explain fully based on the pharmacological principles of tastes and powers.



**Table 5.1. The five ingredients of *khyung-nga tshéden* ('authentic Garuda-5') as mentioned in Khyenrab Norbu's *Düdtsi Bumzang* (p. 150-151, republished by Arura in 2007) together with the quantities and the body parts of the Garuda mythical bird to which they correspond. Gyatso and Hakim (2010) summarised the function of each component in the formula, which was not specified by Khyenrap Norbu but which can be found in various *materia medica* texts.**

Khyenrab Norbu's <i>Excellent Vase of Elixirs</i>	Garuda body parts	beneficial qualities of ingredients (Gyatso and Hakim 2010, p. 317)
<i>aru</i> , 40 (50%)	flesh	[chebolic myrobalan] treats all ailments and balances the humors
<i>ruta</i> , 10 (13%)	bones	[costus] treats wind and bile and benefits the stomach
<i>shudak</i> , 6 (8%)	muscles (tendons)	[sweet flag] treats wind and contagious fever, supports the digestive system
tsenduk, 20 (25%)	heart	[dark-blue aconite] alleviates pain and inflammation
<i>latsi</i> , 3 (4%)	blood	[musk] treats infectious disorders

**Table 5.2. The Garuda-5 avatars currently manufactured by Men-Tsee-Khang (as compounded on 27 February 2014, under supervision of *amchi* Penpa, Audio recording 90) and PADMA (translated from the Swiss package insert). This list does not adequately reflect all necessary (pre-)processing and detoxification procedures. The aconite/myrobalan ratio<sup>74</sup> is 1/5 and 1/10 respectively, which is much less than 1/2 in Khyenrab Norbu's formulary as shown above. The amounts of several Men-Tsee-Khang ingredients were left unspecified on purpose to respect their intellectual property.**

Men-Tsee-Khang <i>khyung-nga</i>	PADMA <i>Grippe-Formel</i> (Flu Formula)
<b><i>aru</i> (fruit, 250 kg or 39%)</b>	<b>costus (root, 75 mg or 20%)</b>
<b><i>ruta</i> (root, ? kg)</b>	angelica (root, 50 mg)
<i>shudak</i> (root, ? kg)	<b>chebolic myrobalan (fruit, 50 mg or 14%)</b>
<b><i>mänchen</i> (root, 55 kg or 9%)</b>	fenugreek (seed, 37.5 mg)
<i>gulnak</i> (resin, ? kg; <i>gla rtsi</i> substitute)	restharrow (root, 37.5 mg)
black-coloured pill coating	hemp-nettle (herb, 37.5 mg)
	peppermint (herb, 37.5 mg)
634 kg in one batch (100%)	sage (herb, 37.5 mg)
	<b>aconite (root, 5 mg or 1.4%)</b>
	excipients
	367.5 mg in one capsule (100%)

In Chapter 6, I analyse how aconite (1 mg of powdered tuber is present on average in one capsule containing 403 mg of PADMA 28) was excluded from several later products in the PADMA 28 series due to European national regulatory pressures. But this can hardly clarify the large drop in aconite content, which lies at the heart of Garuda-5, particularly at Men-Tsee-Khang. My conversations with doctors and experiences at Indian wholesale markets

<sup>74</sup> Besides the total percentage of aconite in each formula, I also calculated the ratio between the weights of aconite and myrobalan. This not only provides a second means of comparison between formulas, but also makes pharmacological sense. *Aru* is used in Tibetan medicines as a balancing and detoxifying agent, it thus neutralises potentially negative effects of the other ingredients. Phytochemically, chebolic myrobalan is known for its high tannin content. Tannins bind and precipitate proteinaceous molecules including alkaloids, which are considered to be aconite's major active compounds.

(Chapter 2) ensured me that this was certainly not due to a lack of availability or the high price of black aconite: 155.3 kg was used in the administrative year 2013-2014, bought for an average price of 475 INR (roughly 7 USD) per kg. In comparison, 565.6 kg of the non-toxic white aconite (*bongkar*, known to be critically endangered; Beigh et al. 2008) was purchased at 4,200 INR/kg (63 USD). Penpa explained that the former is cheaper because it is in much less demand (Notebook VIII, 12 May 2014). The inclusion of well-known European herbs in PADMA *Grippe-Formel*, on the other hand, was traceable to formula 173 on the list of recipes provided by Peter Badmajew to PADMA founder Karl Lutz in the 1960s. It is a testament to the innovative nature of Buryat Sowa Rigpa (Dashiyev 1999, see also Chapter 6).

In the following sections, my aim is to investigate the reasoning behind and the circumstances that led to these contemporary reformulations and to highlight the impact of differing ecologies of toxicity. PADMA's case shows the influence of regulations and biomedical notions of toxicology and drug safety, while at Men-Tee-Khang I argue that an adaptation to Tibetan exile and Indian local biologies was required because this new socioecological setting altered the configuration of the poison/medicine interface. As such, this chapter illustrates that the boundaries between medicine (efficacy) and poison (toxicity) are dynamic as well as contingent and how considerations of safety – and its antonyms danger and risk – mediate this interface and reconfigure what *men* versus *duk* are.

## 5.2 PADMA's Garuda-5: *Grippe-Formel*, the flu formula

While Garuda medicines can quite easily be ordered online from dubious websites operating in legal grey zones<sup>75</sup>, Garuda-5 – and arguably Tibetan medicine as a whole – remains a fringe phenomenon in Europe. PADMA AG, the only pharmaceutical company

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<sup>75</sup> A pack of 28 'Garuda 5 Tibetan Herbal Formulation' pills can be ordered for \$15 as a 'talisman' from [www.jcrowmarketplace.com](http://www.jcrowmarketplace.com). 'Cliff Garuda Pill' can be purchased for \$35 for 45 pills at [www.tibetandocctors.com](http://www.tibetandocctors.com) (both accessed 7 December 2015). Both webpages showcase conspicuous disclaimer statements indicating that the given products and information have not been evaluated by the FDA, the US Food and Drug Administration.

legally manufacturing multi-compound medicines based on Tibetan formulas in this part of the world, usually produces one small batch of *Grippe-Formel* once a year which may only be sold by licensed pharmacies and drug stores (German: *Drogerien*) or prescribed by doctors, dentists and naturopaths (*Heilpraktiker*) in one part of the small Kanton of Appenzell in the northeast of Switzerland. Unlike PADMA LAX, 28 and DIGESTIN which are nationally registered (and available in other countries under several product names), PADMA *Grippe-Formel* is part of a series of seven medical products registered exclusively in Appenzell Ausserrhoden. This Swiss province exceptionally allows this type of registration of over-the-counter products for self-medication purposes, based on a longstanding local tradition of natural (and alternative) healing practices that was recently recognised as a Living Swiss Tradition in accordance with the UNESCO Convention on Intangible Cultural Heritage (Bundesamt für Kultur, Schweizerischen Eidgenossenschaft 2012). Its liberal health regulation, including on the acceptance of recipes compounded and dispensed on the premises of practitioners (the so-called ‘house specialties’, *Hausspezialitäten*) has fostered famed healers such as Dr Alfred Vogel (1902-1996), a flourishing alternative medicine industry, as well as medical tourism for more than two centuries. More than 250 Heilpraktiker are currently registered, a large number considering the total population of about 54,000 living in Appenzellerland. However, with the introduction of a new federal drug law in 2002 (Bundesrat der Schweizerischen Eidgenossenschaft 2002) cantonal registrations were no longer permitted after a six-year transition period, which was however subsequently extended until the end of 2013. A second revision package of the Therapeutic Products Act (*Heilmittelgesetz*) which came into force January 2014 extended this transition once again until end of 2017. *Grippe-Formel* is legally saved for now, but this category of medicines is in a risky position as became clear to me in the following conversation with PADMA’s CEO (Audio recording 105):

With the new *Heilmittelgesetz* Appenzell [cantonal registration] is again legal. When it is legal, then the people will test it. They will say ‘[this is] medicine, medicine’. This one guy checking this [at the Appenzell health department] says ‘yes, no, yes’. He will maybe once make a mistake. That's what the federal guys [at Swissmedic] said to me, they are waiting for that. I hope it doesn’t happen, but unfortunately today... Things get crazier because when international guys realise this, it will start, things will happen.

PADMA developed most of the Appenzell formulas in collaboration with *amchi* Pasang Arya in the nineties. But this time of bold experimentation soon came to an end when it became clear that these cantonal medicines also had to conform to Swissmedic quality requirements as they are produced in Zürich on the same site as nationally registered products, implying significantly more administration work as well as expenses. So far however, at least one interpretation of Garuda-5 has remained available officially – as a medicine – in a section of the Swiss market. We can only realise just how exceptional this is when we reconsider the composition of PADMA *Grippe-Formel* in the context of biomedical risk assessment. The infamous ingredient aconite is an exemplar of the European health and safety perspective on potent herbal substances.



Figure 5.3. Current packaging of PADMA *Grippe-Formel* as sold over-the-counter in Appenzell Ausserrhoden. One box contains five blisters with 60 capsules in total, and is usually sold for around 29 Swiss Francs. (illustration taken from [www.padma.ch/produkte/weitere-produkte-ch/kantonale-arzneimittel/padma-grippe-formel/](http://www.padma.ch/produkte/weitere-produkte-ch/kantonale-arzneimittel/padma-grippe-formel/) on 7 December 2015)

### 5.2.1 The *muleta* of the biomedical bull: aconite and its alarming alkaloids

*Khyung-nga* has no chance in Europe. You can simply forget it. This aconite, for the authorities, is the red blanket in bull fighting. They run like a bull for this. It is incredible.

(Herbert Schwabl, Audio recording 65)



Figure 5.4. Photograph of an archival sample of *Aconiti Tuber*. It was stored in a plastic screw-top bottle, in a small labelled cardboard box with a safety data sheet, in the laboratory safety storage cabinet and marked by a yellow-black skull and crossbones triangle. Amongst plant ingredients used by PADMA, only the raw material and powder samples of aconite and of strychnine tree seeds (*Strychnos nux-vomica* L., present in PADMA LAX in small quantity as 'Brechnussamen') have to be stored in this cabinet.

During the conversation quoted above, Herbert enumerated two prime causes that lead to trouble in the process of registering Tibetan formulas in Europe as traditional medicine (besides proving 'traditional use' within Europe, see Chapter 6). On the one hand there are issues of quality control particular to multi-compound herbal recipes such as the identification of the raw materials in mixtures (Chapter 4). On the other, the recognition of plants as active pharmaceutical ingredients which were previously unknown present another hurdle, especially for non-European traditions. The relevant authority will be

hesitant to be the first to recognise these novel entities, to stick its neck out, so to speak. Arguments based on comprehensive literature study as well as expert reviews need to be provided to establish its safety, even if the substances may be well-known food items such as pomegranate (an ingredient of PADMA DIGESTIN) and Nepalese plum (PADMA NERVOTONIN). In the case of *Grippe-Formel* (and PADMA 28) however, there is an extra complication: the potential toxicity of aconite (Figure 5.4).

JVDV: What makes it different if it's a herb, not a toxic molecule for example? I guess this is much easier to standardise, to avoid the risk of getting the wrong dose?

HS: No. The problem is the following: only the guys working with herbs are so naive to present such substances to the authorities. Because we say 'it's nature'. The other guys say, 'how come you start with such a crazy thing. We never do this since all these [poisoning] scandals.'

JVDV: Why is there 'collateral damage' in this case?

HS: 'Let's make some safety standards about toxicity levels, and this and this.' The normal industry says 'yes we agree'. Then they say 'we have to work based on the risk-benefit scenario'. Paracetamol or aspirin have a high toxicity level, you can get kidney failure, that is quite known. 'But aspirin we cannot lose, it is such an important medicine, so helpful, so many studies.' Then we come with the *Khyungnga* formula. What is our proof? There is no benefit. Traditional medicine has the problem that the benefit is zero in this ratio. Even if the risk is small, with zero benefit it goes up to infinity. This is not told to the public, because the public would conceive this argument as cynical.

(Audio recording 105, 9 May 2015)

Because the evaluation of safety is based on the risk/benefit ratio (see Wiesner 2014 for a short introductory overview of safety evaluation for THMPs), traditional herbal remedies are side-lined as they are not backed by expensive clinical trials that prove their efficacy or 'benefit'.<sup>76</sup> PADMA *Grippe-Formel* seems to have escaped this logic of risk analysis through

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<sup>76</sup> PADMA *Grippe-Formel* is a cantonal registration as medicine, which is much less demanding in terms of safety, quality and efficacy requirements compared to regular national registrations for medicines or Traditional Herbal Medicinal Products (THMPs). For the latter two an extensive dossier has to be presented

the Appenzell loophole, but on a different scale the system is nonetheless maintained. The risk of exposure is restricted to tiny Appenzell Ausserrhoden, which accounts for less than one percent of the total Swiss population. In a federal state like Switzerland, with locally devolved responsibilities, these risks are so far deemed manageable. The risk/benefit ratio has also been applied to plants as single ingredient herbal remedies, notably by Konstantin Keller (1994). Formerly at the German federal health agency, Keller was part of ESCOP (the European Scientific Cooperative on Phytotherapy), an umbrella organisation aimed at representing the herbal medicine sector in discussions with European regulatory agencies which published a widely disseminated series of sixty 'scientific' (i.e. evidence-based) monographs on commonly traded herbs in the late 1990s. ESCOP was generally in favour of free trade of herbs across the EU, and was striving towards increased harmonisation of the relevant legislations. In this context, Keller drafted a table listing 145 'most relevant herbal drugs' used in at least half of the member states. A second table titled 'Herbal drugs with serious risks without any accepted benefit' lists *Aconitum* (all species and parts, due to toxic alkaloids) as the first of a series of 'obsolete herbs'. Keller (1994, p. 44) concluded that: 'Without plausible benefits, discussion on drug risks is hardly possible. Therefore a systematic risk evaluation should include the plausible proof of efficacy'. Ironically, with the introduction of Traditional Herbal Registration clinically proven efficacy has become irrelevant, effectively barring potentially potent herbs from entering the market via these channels (Chapter 6).

Nevertheless, alkaloids continue to be researched intensively in the search for new biomedical drug leads especially since the pharmaceutical success stories of anti-cancer chemotherapeutic compounds such as paclitaxel (Taxol<sup>®</sup>, see Walsh and Goodman 2002) and vincristine (Oncovin<sup>®</sup>) from the 1960s onwards, which were initially extracted from plants. This is the point at which questions of biopiracy and intellectual property rights

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to the authorities in a predetermined format, containing expert reviews of and modules on quality as well as clinical (with humans, for traditional registration only proof of traditional use within EU) and non-clinical (on animals and *in vitro*) studies of all ingredients and the formula in its entirety. Aconite would need extra attention: poisoning case reports should be discussed under the clinical, and toxicological studies under the non-clinical sections. In the case of PADMA 28 for example, PADMA had to argue that the single (two capsules) and maximum daily doses (six capsules) are well within safety limits through a comparison with homeopathic products (Audio recording 103 with Elisabeth from PADMA regulatory affairs).

come to the fore also for Tibetan medicine. Even though clinical research on Tibetan medicine in European languages is rather limited and very heterogeneous (see PADMA 2015, Reuter et al. 2013, Witt et al. 2012 for recent reviews), anthropologist Vincanne Adams (2002) critically appraises the criminalisation of Sowa Rigpa and its practitioners as well as the shift in ownership of medical knowledge that can accompany randomised controlled trials and the pursuit and trademarking of active ingredients. When Tibetan medicines are assumed to be reducible to magic bullet molecules – which is not PADMA’s approach – the door to patenting these ‘new’ inventions based on natural products is opened. As was already noted by Adams, this is exactly what happened in a small clinical trial of the precious pill Red Coral-25 (*jumar*) for migraine by Aschoff et al. (1997). Not only is the study on migraine, a biomedical disease construct with no clear Tibetan equivalent as the authors themselves admit, it was also carried out with a much simplified 13-compound formula to get rid of problematic ingredients such as mercury and musk. As the study shows some positive effects after two to four weeks for the twenty-two patients involved, the authors proceeded to tackle the problem of standardisation through the example of (black) aconite and its alkaloids as major active ingredients (see also Maier 2004). By taking aconite ‘*pars pro toto*’ for the entire formula, the researchers succumbed to the temptations of orthodox biomedical drug development. Moreover, Aschoff filed a patent for the use of aconitine and/or aconine extracted from aconite tubers for migraine (application date 27 March 1995, DE 19511235 A1).<sup>77</sup> This serves as an example that shows how aconite and its alkaloids are on the one hand phased out of complementary medicine while at the same time remaining a source of potential chemical drug leads along the lines of Adams’ argument.

### 5.2.2 The biomedical perspective: toxicology and pharmacovigilance

The regulatory approach towards drug safety is based on the science of toxicology and its application to marketed drugs in the discipline called ‘pharmacovigilance’. As these

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<sup>77</sup> The patent was discontinued on 22 January 2009. I discussed the use and detoxification of aconite in Tibetan medicine – which he believes is generally being phased out or greatly reduced in a similar vein to mercury – via e-mail correspondence with Aschoff (13 April 2014). No answers were obtained in relation to my queries on the patent.



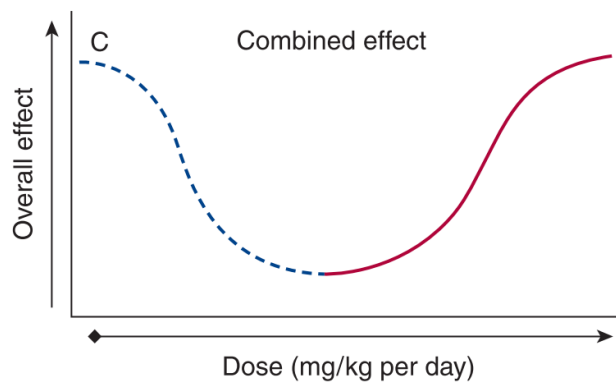
(re)define and shape the poison/medicine dichotomy by charting dose-response relationships and through risk assessments, a short excursus is warranted. In a 1454-page long toxicology science textbook, a poison is defined as:

any agent capable of producing a deleterious response in a biological system, seriously injuring function or producing death. This is not, however, a useful working definition for the very simple reason that virtually every known chemical has the potential to produce injury or death if it is present in a sufficient amount. (Klaassen 2013, p. 17)

The above brings us to the Swiss/German/Austrian renaissance physician-chemist Paracelsus whose revolutionary views remain integral to toxicology: (1) experimentation with single chemical entities (as opposed to mixtures) is essential to determine their effects, (2) one should distinguish between their therapeutic and toxic properties, which (3) are not always clearly distinguishable, except by dose, and (4) the effects of chemicals have a degree of specificity. The characteristics of exposure further depend on the route, site, duration and frequency of exposure. Coming back to the dose-response relationship:

Whatever response is selected for measurement, the relationship between the degree of response of the biological system and the amount of toxicant administered assumes a form that occurs so consistently as to be considered the most fundamental and pervasive concept in toxicology. (Klaassen 2013, p. 22)

Interestingly, the concept of 'hormesis' suggests that 'some nonnutritional toxic substances may also impart beneficial or stimulatory effects at low doses but that, at higher doses, they produce adverse effects' (p. 25, see Calabrese and Blain 2005), resulting in a U-shaped dose-response curve. Even though this approach is based on a set of assumptions that is complicated and confounded by multiple factors I did not discuss here, it is interesting to note how according to toxicology the dose fundamentally determines the poison/medicine dichotomy.



**Figure 5.5. Hypothetical dose-response curve depicting a hormetic effect (reproduced from Klaassen 2013, p. 25). At low doses a protective or beneficial response is stimulated (blue dotted line), but if the threshold is crossed the net effect will be adverse (red line). A similar graph is found in case of essential nutrients, where the dose determines whether the result is deficiency, homeostasis or toxicity.**

Pharmacovigilance on the other hand, a pharmacological discipline commonly defined as ‘the study of the safety of marketed drugs under the practical conditions of clinical usage in large communities’ (Andrews and Moore 2014, p. 1), strives to monitor drug safety and to identify adverse drug reactions previously unrecognised in clinical trials, to assess risks and benefits, and to communicate and respond to drug safety concerns. We live in a risk society (*Risikogesellschaft*, Beck 1992, original in German in 1986). This reporting and evaluation system equally pertains to herbal medicines, which presents scientists, regulators, and companies with a set of unique challenges (Shaw et al. 2012): (1) plants have complex and variable chemical profiles influenced by geography, genotype, plant part, harvesting time and conditions, and the storage, processing and combination of herbs, (2) the regulation and classification of herbal products varies, (3) nomenclature and labelling are multiple (diverse healing traditions), (4) the sourcing of herbal remedies is complicated (self-medication, over-the-counter, medical professionals or herbalists, etc.), and (5) herb-drug interactions are underreported.

Pharmacovigilance at PADMA is mostly outsourced to a specialised pharmaceutical consulting company in Austria. They are contracted to offer services such as the processing of individual case reports on side effects and the publication of a Periodic Safety Update Report (PSUR), which reviews safety data relevant to a particular product. Patients/consumers can communicate adverse reactions via their doctor, pharmacist or

chemist, but can also phone PADMA directly for general enquiries or to communicate complaints. Depending on the severity of the adverse reaction (UAW, *unerwünschter* – literally ‘not wished for’ or ‘unwanted’ – *Arzneimittelwirkung*), the decision trees followed will lead to different measures to be taken. The most commonly reported side effect for PADMA 28 out of the roughly 40-45 UAWs per year is stomach upset, which can probably be linked to its camphor content (Erich, Audio recording 67). This falls under the medicine’s possible side effects mentioned in the package insert: ‘[g]astrointestinal disorders and cutaneous reactions or itching may very rarely occur. Isolated cases of palpitations and slight restlessness have been observed in predisposed individuals’. For *Grippe-Formel*, it states that no side effects have been documented so far. Surprisingly, when I asked *amchi* Dönckie – a female Tibetan trained at Lhasa Mentsikhang and operating as health advisor (*Gesundheitsberaterin*) in Zürich and Vienna – if she made use of Garuda-5, she responded negatively due to the fear of negative reactions (Audio recording 97):

D: This I am not using very much. The reason is because you have western medicine, which is good for acute problems like infection. Of course, I am not preferring antibiotics. But western people are reacting strongly to *khyung-nga* and these strong medicines. I don’t dare to give this kind too much.

JVDV: You are saying in the West people are reacting differently to these medicines like *khyung-nga*?

D: Yes. I think so. They are eating more medicines than Tibetans are doing, which harms their body, makes them very sensitive; the reaction is very nervous. They are very... not common medicines. It is well-known for Tibetans, maybe because they are not taking western medicines. Maybe they [westerners] react stronger to medicines because of this.

Her somewhat circular statement which seems to attribute the increased possibility for adverse effects when taking Garuda-5 to a heightened exposure to the side effects of biomedical pharmaceuticals urged me to revisit the production, prescription, and effects of Garuda-5 at Men-Tsee-Khang in India under the next heading, paying attention to local biologies. It also reminded me of an opposite tendency in German-speaking Europe where practitioners and patients explicitly market and seek out the use of PADMA 28 *with* aconite

– the so-called ‘original’ Swiss formula – as superior to derivative products available in other countries, even if it is only a 1 mg or 0.25% difference per capsule of which experimental studies indicate no significant difference in anti-inflammatory action.

Moving on from toxicological and pharmacovigilance theory to a consideration of practitioners and patients/consumers in Europe, (herbal) drug safety remains a cause for concern. Kloos (2010, p. 102-105) describes how the diagnosis of a Genevan woman who developed severe anaemia after taking traditional Tibetan pills for half a year in 2001 led to laboratory analyses that indicated excessive heavy metal contamination (with lead in this case), and consequently to health warnings in Swiss public media.<sup>78</sup> This in turn caused a panic amongst Swiss patients (and more tests indicating mercury contamination), made it more difficult to import Tibetan medicines into Europe, and indirectly led to the closure of Men-Tsee-Khang’s Amsterdam branch clinic (which was the only one outside India). Eventually, these events transformed the (self-)regulation of Sowa Rigpa in exile through the establishment of the Central Council of Tibetan Medicine. High concentrations of heavy metals continue to be reported in Asian remedies available in the West (see Cooper et al. 2007 for Chinese medicine in Australia, and Martena et al. 2010 for a Dutch market study including Tibetan medicines) or via the internet (e.g. Saper et al. 2008 for Ayurvedic products from a US perspective). However, these studies do not actually evaluate clinical effects or consider Men-Tsee-Khang pills in particular (but see Sallon et al. 2006), nor do they sufficiently take into account which metal compounds are formed and their bioavailability, let alone the impact of multi-compound synergistic effects and of Asian pharmacological detoxification procedures. Nevertheless, it is clear that the classical textual concepts of poisons and their detoxification, unsuitable medicine and wrong treatment cannot grasp the issue of heavy metal (cross-)contamination, which is particularly worrisome in today’s context of mass-production and mass-consumption (lack of practitioner-patient feedback, increasing importance of batch-to-batch variability), increased average lifespan (chronic toxicity), and biomedical (regulatory) hegemony.

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<sup>78</sup> A similar case of severe mercury poisoning was recently covered in a German newspaper (*Pillen aus der Hexenküche*, *Der Spiegel* 36 (2015, p. 111-112). A 55-year old woman from Hamburg was hospitalised after taking Ayurvedic pills from Sri Lanka daily for more than two months.

Leaving aside heavy metals and other sources of contamination invisible to the naked eye (micro-organisms, pesticides, etc.), aconite may well be one of the potentially most toxic substances used in Tibetan medicine, especially the black type called *manqin* in Ma et al. (2015). Aconite poisoning – mainly in the form of acute and possibly fatal cardio- and neurotoxicity – is a rare but well-known phenomenon especially in East Asian countries that is often related to faulty identification and processing of Chinese medicines (Chan 2011, 2009; Nyirimigabo et al. 2015; Singhuber et al. 2009)<sup>79</sup>. A very small number of serious cases with *Aconitum napellus* have also been reported in Switzerland, as this species grows abundantly in mountainous areas (Jaspersen-Schib et al. 1996, and more recently Compagnoni et al. 2013). Chan (2009) reports that the estimated lethal dose for humans is about one gram of fresh plant material or 5 ml of alcoholic tincture, corresponding to 2 mg of aconitine and considering that the alkaloid content of the different plant parts varies significantly (roots and tubers > flowers > leaves and stems).<sup>80</sup>

PADMA reduces the risk of aconite toxicity in PADMA 28 and *Grippe-Formel* by standardising the concentration of ether-soluble alkaloids to 0.5% through the addition of mannitol to the powdered roots, while also carefully measuring the amount of aconite powder (one and five mg respectively per capsule) added to the mixture and thoroughly homogenising it mechanically. A formally documented and inspected quality system is in place aimed at minimising risks (as laid out in Chapter 4), in which the quality control lab occupies a central place. At Men-Tsee-Khang, the lab is able to detect the presence/absence (not the quantity) of alkaloids, but standardisation is not carried out. Yet,

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<sup>79</sup> Nevertheless, based on a large-scale practitioner survey ‘the species used in CMM [Chinese *materia medica*] currently most used by EU practitioners are unlikely to cause serious adverse events’ (Williamson et al. 2013, p. 461; see also van der Valk et al. in press).

<sup>80</sup> Chan (2009, p. 279) summarises the toxicology of aconite as follows: ‘The cardiotoxicity and neurotoxicity of aconitine and related alkaloids are due to their actions on the voltage-sensitive sodium channels of the cell membranes of excitable tissues, including the myocardium, nerves, and muscles.’ This results in the following clinical effects: ‘Patients present predominantly with a combination of neurological, cardiovascular, and gastrointestinal features. The neurological features can be sensory (paresthesia and numbness of face, perioral area, and the four limbs), motor (muscle weakness in the four limbs), or both. The cardiovascular features include hypotension, chest pain, palpitations, bradycardia, sinus tachycardia, ventricular ectopics, ventricular tachycardia, and ventricular fibrillation. The gastrointestinal features include nausea, vomiting, abdominal pain, and diarrhea. The main causes of death are refractory ventricular arrhythmias and asystole and the overall in-hospital mortality is 5.5%.’

I argue that production as a whole can be interpreted as a step-wise detoxification/purification process, which I cover for Men-Tsee-Khang after elucidating their perspective on the safety of Tibetan medicine(s) under the next heading.

### 5.3 ‘This is why everyone knows that Tibetan medicines have no side effects’

On the third day of the ICTAM VIII conference in South Korea<sup>81</sup>, Men-Tsee-Khang doctor Jamyang Dolma presented on ‘The Effectiveness and safety of traditional Tibetan medicine in the treatment of challenging diseases’. Jamyang first emphasised that Sowa Rigpa has a long history of empirical observation and research, which ensures its safety and efficacy, and that practitioners do not question the reliability of the classical texts nor the efficacy of their system. However, globalisation has brought the need for ‘evidence’ and modern scientific studies even if these do not fit well with traditional concepts. She then summarised the results of clinical research undertaken by Men-Tsee-Khang on diabetes, hepatitis B and hypertension, and on processed mercury. Her conclusion was that Tibetan medicine has been proven to be very beneficial, that ‘it is totally safe’, and that authenticity is the key to its safety and efficacy.

About a week later, during a five-day introductory course on Tibetan medicine in English at Men-Tsee-Khang college (16-21 September 2013), *amchi* Nyima Gyaltzen gave a lecture on the *Seven Essential Limbs* – which detail the proper processing of herbs into medicine according to the *Four tantras* – and came to a similar conclusion: ‘This [adhering to these textual standards] is why everyone knows that Tibetan medicines have no side effects’ (Notebook III; Diary 2013, p. 71). These bold public statements do not imply, however, that *amchi* mindlessly accept that all their medicines are equally beneficial and by extension ‘safe’ (the two are commonly confounded by *amchi* as noted by Gerke 2015) in all circumstances. In their statements, Tibetan doctors assume that the practitioner-patient interaction modulates prescription and use as Rigzin Sangmo from the R&D Department

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<sup>81</sup> ICTAM VIII was held 9-13 September 2013, and stands for International Conference of Traditional Asian Medicines. It is the main event organised by IASTAM, the International Association for the Study of Traditional Asian Medicine.

exemplified in her coming to terms with my questions on the existence of side effects (Diary, 1 May 2014): ‘for example, if you take cold [potency] medicines for a very long time this might negatively affect your digestion, but the practitioner can foresee this and adapt the medicines accordingly’. The practitioner attunes the qualities of the medicine to the humoral situation of the patient. She disliked attributing ‘side effects’ to Tibetan medicine – one of the negative hallmarks attributed to biomedical drugs for which Sowa Rigpa is globally represented as a natural, harmless complement or alternative<sup>82</sup> – but did not deny the possibility of ‘adverse reactions’ such as constitutional incompatibility or allergies. Saying that Tibetan medicine has side effects is often taken as a smear on the whole system, a lack of trust in the practitioner’s traditional expertise, the classical texts or even the Medicine Buddha *in extremis*. These statements are part of a larger discursive trope expressed by both practitioners and patients of Sowa Rigpa that influences healthcare perceptions and decisions in the ubiquitous scenario of medical pluralism in Dharamsala (Prost 2008, p. 36-41 and 58-60). It also feeds into its globalisation and spread into alternative medicine and wellness markets (Janes 2002). Stereotypically, biomedical pharmaceuticals are strong, have rapid effects but might bring about adverse reactions whereas Tibetan medicine is soft, slow-acting, natural and eradicates the root-cause of the disease (see Besch 2006, p. 191-194 for the same trope in Spiti).

In our conversation, Rigzin further pointed out the difficulty of conducting clinical research and rigorously following up patients at Men-Tsee-Khang clinics given the limited resources. Patients who are unhappy with the treatment usually explore other options and do not return and fill in the study questionnaires, and cured patients might not return. In this situation, it turns out to be nearly impossible to identify negative reactions statistically, outside the doctor-patient interface. On top of that, what a Tibetan in Dharamsala might consider a minor nuisance as part of the healing process, European patients may consider a problematic side effect. Even engaging with Indian road traffic abundantly made clear to

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<sup>82</sup> In the clinical interactions I observed between *amchi* and Tibetan patients (see section 5.3.3), Tibetan medicines were not rarely employed to abate the side effects perceived by patients undergoing strong and prolonged biomedical treatments (e.g. for tuberculosis, hepatitis, and HIV), and to support and protect weakened organs. A similar usage of *mani rilbu* was noted by Kloos (2010, p. 114).

me the very different perceptions of risk and danger. As Tsultrim Kalsang explained to me, taking medicines can have unpleasant but necessary effects (Audio recording 108b):

Sometimes people taking *khyung-nga* or other strong medicine feel uncomfortable. It is not going to worsen, sometimes it gives more [healing] effect [in the end]. It takes time. If it continues like this, then you have to stop [taking the medicine]. Two or three days is ok. You need some movement, without movement there is no effect. A little bit worse, going down [purgation] or up [emesis]. If I have a medicine for constipation and get loose motion, then the medicine gives effect. It doesn't mean there is another disease. It is the effect. If I take medicine for constipation with no effect: no movement, still same as before. [Then] what is the use of medicine?

Nevertheless, wrongly combined and constitutionally incompatible foods – and by extension medicines – can become poisons according to Tibetan medical conceptions. Pasang Arya elaborated on this in response to a question by one of the participants in the Tibetan Medicine Education Center (TME) advanced course which I attended (online seminar, 7 November 2015):

student: In your experience, do you find that those with food intolerance are also sometimes more intolerant of herbal medicines?

PA: Definitely (starts laughing). I have enough experience with herbs intolerance. It is funny, really. Still I didn't get a really good answer for that. Some people, for spices like cardamom, have an intolerance or allergy. Some with cinnamon. Some with simple herbs. Some people with Sendu-5, [PADMA] Digestin. It is very simple: pomegranate, cinnamon, cardamom, *Piper longum* and galanga. These five very simple ingredients are generally used in food. [But] some take it and get sores in the mouth, or pimples on the lips. [...] Generally, in Tibetan medicine I think [this is called] *menkyi öpo mépa*: not-suiting medicine. It does not suit the patient. When the patient takes it, he gets nausea and vomits, that kind of concept.

Pasang provided a starting point for a Tibetan medical explanation for 'unsuitable medicine', stressing the need for oral instruction (*mengak*) and knowledge-in-practice beyond texts. Tenzin Thaye at Men-Tsee-Khang's pharmacy gave the example of camphor as a possible source of intolerance. Being convinced that PADMA produces very good and



very strong medicines, he was inspired by the success of PADMA 28 to use more camphor medicines in his daily practice (Audio recording 86).

JVDV: And the medicines PADMA is making, what do you think about these medicines?

TT: Of course it is good, it should be very strong medicine. I mean, I saw the film *Sowa Rigpa* they made. And a lot of patients like it, so it is very good. I said it should be very strong, because you know, on camphor we have a very impressive saying in Tibet: it is the king of the medicine, especially [due to its] very cold and rough nature. But if you don't prepare it or compound it in a very good way, it is very very harmful. It should not be like poison, but very harmful. Because its rough nature increases *lung*. Now, at present in Tibet, we really don't use that much camphor, much less. [...The saying goes that this king of medicine] will be harmful more than healing, kill more people than help people. [...] *tsemduk*, [black] aconite is the king of poison. This will be helpful more than harmful. These two are compared.

This saying comparing the effects of camphor and aconite – the kings of medicine<sup>83</sup> and poison respectively – warns us that what is beneficial and what is toxic is not always straightforward, and may even turn out to be opposite to our expectations. Similarly, *amchi* Choelothar mentioned that *gabor* is often taken out of formulations as it is dangerous to use for patients suffering from *ngyen né*; infectious epidemics such as Hepatitis B and Tuberculosis, which are locally prevalent (Barbara Gerke, Personal Communication, 2 June 2016).

During my fieldwork and in conversations with practitioners and patients, I came across only very few instances where Tibetan medicines were deemed to have had a negative influence on people's health. Except for the widely reported case of heavy metal poisoning in Switzerland and rare cases of mild stomach upset after taking PADMA 28, two other repeatedly mentioned formulas will be discussed here. The compound named 'Golden-5' (*serdok-ngapa*) used to be produced in pill-form by Men-Tsee-Khang, but patients complained that the awful taste made it impossible to take these pills and even made them

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<sup>83</sup> *Arura*, chebulic myrobalan is also referred to as the king of medicine (*menkyi gyälpo*), Drungtso and Drungtso 2005, p. 346).

vomit (Notebook III, *amchi* Pema Tsetso). In response to these reports, nowadays *Serdok-5* is made in granular form and dispensed in sealed plastic pouches to facilitate ingestion. From my personal experience in taking this medicine for weeks with boiled water at noon time in Dharamsala to treat an excess of *tripa* and yellow sclera, I can attest that its strong sour/bitter taste is still exceptionally unpleasant compared to other Tibetan medicines. Some reported unintended consequences of taking Garuda-5 however are much more severe, but have equally led to adaptations in its production. Possible reactions include burning and numbing sensations of lips and tongue, dizziness, fainting (Audio recording 110, *amchi* Penpa Tshering), and weakened heart rhythm (Audio recording 111, *amchi* Tsering Norbu).

### 5.3.1 Dealing with aconite toxicity, the shadow of the Garuda at Men-Tsee-Khang: dogma, detox or dosage?

When I asked Tsultrim Kalsang if nowadays less aconite was being used because people realised how toxic it is, he explicitly responded that this was not the case (Audio recording 80). The amount of Garuda-5 that will be prescribed first of all depends on the condition of the patient (being careful with children and the elderly) and the nature and severity of the disease (a stronger disease may need a higher dose). But the amount of aconite in the formula has not changed, it is standard and mentioned in authoritative texts. The formulas are fixed. Depending on which subtype of *bongnak* and its strength (i.e. how poisonous it is, as judged by root colour, appearance and sensation on the tongue) however, the method for detoxification may vary (Audio recording 108). The quality and availability of natural resources, itself determined by their habitat and harvesting patterns, impacts pharmaceutical practice. Practitioners need to be sensitive to this local ecology. Tsultrim has repeatedly been consulted by the pharmacy to confirm that the roots are of the right kind. Prolonged boiling of the roots in water, or treatment with cow milk or urine can be undertaken if necessary to transform the poison into medicine.<sup>84</sup>

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<sup>84</sup> Several experimental chemical analyses have confirmed that traditional processing methods are effective at the extraction of diester diterpene alkaloids (DDAs) and their conversion into less toxic monoesters (MDAs) (Jaiswal et al. 2013, Nyirimigabo et al. 2015, Singhuber et al. 2009).

But Tsultrim is an expert on plants, not a trained pharmacy expert. Penpa, who is involved in the day-to-day production of medicines, offered a slightly different and more practical perspective (Audio recording 81). He admitted that in effect the quantity of aconite is usually reduced to levels below what is indicated in formularies:

It is the case. Because in earlier times people were stronger, not because of [the presence of] this poison. They could take this amount of *tsenduk*. These days people more easily get the effect. So we have to reduce it. [...] Not only this *tsenduk*, also these burning [cones]: moxa. Before we used big cones. Now we cannot use the bigger size, we use very small [ones]. Earlier, people were used to hard work. [They had] good energy in their body, they could take all this. These days people are more relaxed. [...] Usually *tsenduk* is not in huge quantity in the medicine, but we had to reduce this [further] slightly.

‘The bodies of people nowadays have become frail due to a lack of manual labour’, was an observation echoed by several Tibetan doctors I met. Undoubtedly taking the idealised harsh lifestyle of nomads and farmers on the high Tibetan plateau as a reference, medicines must now be adapted to the docile bodies of Tibetan exile, Indian and ‘Western’ patients. *Amchi* must not only recognise the impact of local ecologies, but also pay attention to how these interact with and shape bodies. In the case of aconite we can therefore speak of local ecologies of toxicity, a concept that provides a Tibetan medical corrective for the so often reified poison/medicine dichotomy.

As was confirmed by Tsering Norbu, who worked in the pharmaceutical department for several years in the early nineties, *bongnak* roots are boiled in distilled water at Men-Tsee-Khang but are sometimes also used directly (Audio recording 111). The author of a large book of more than six hundred pages in Tibetan that compiles *materia medica* and the formulas in which they are represented from traditional texts, he found that boiling in water was actually not described as a detoxification method for *bongnak*.

Maybe some experienced doctors [in the past] did it like that. But [another form of] detoxification is mentioned. First you have to make ash, [still hot with] fire in the wood. A little bit of fire. After all the wood is burned, [one takes] a little bit warm ash. Put powder of *Aconitum* in a pan, then put it in the ash, and cover [the pan] with paper. After a few minutes, the paper becomes wet. The powder colour becomes a little yellow, then ... Not detoxified,

not like mercury. Mercury has many processes. [But its] energy has become less, that is the idea.

Tséring Norbu said he has seen this being done in Lhasa Mentsikhang when he was there in the eighties. This detoxification method based on heat is laid out in Déumar Géshé Tendzin Phuntsok's detoxification text (1970, based on 17<sup>th</sup> century text).<sup>85</sup> Lastly, I discussed the issue with Penpa Tsering (Audio recording 110). He is a very experienced and well-known pharmacologist who resigned from Men-Tsee-Khang to lead his own production named Kundey Khangsar Tibetan Herbal Products, not far from Dharamsala.<sup>86</sup> Although he agrees with the other, more junior Penpa currently working in the pharmaceutical department that people were stronger in ancient times, he claims it is not possible to identify the variety of different *bongnak* subtypes on the market reliably as Tsultrim does. In line with Tsering Norbu, Penpa Tsering maintains that *menchen* does not need to be detoxified as is done in Ayurveda: *aru*, Garuda-5's main ingredient, controls its toxicity.<sup>87</sup> There is considerable variation in potency due to harvesting time and location amongst other factors, and this should be taken into account through experience and by lowering the quantity accordingly.

JVDV: You say you have to know how toxic *menchen* is to know the dosis. How do you know how toxic it is? Can you taste it or see it?

PT: No, no. [Only] after making the pills. We have to see by experience how much we have to put. After making the pills, we are trying them. If it is okay [then we can use them], if the toxicity is high then we don't have to use that one. We can do like this also: we mix [the pills] again, compounding, putting less or not putting [extra]

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<sup>85</sup> I have not been able to verify if and which aconite detoxification methods are currently being undertaken at Lhasa Mentsikhang, but Tibetan doctors in Dharamsala are confident that there too the amount of *bongnak* has been lowered. Generally, compounding and detoxification techniques are only described superficially or not at all in the major *menjor* textbooks (cf. Blaikie 2014, Cardi 2005-2006).

<sup>86</sup> *Amchi* Penpa Tsering graduated from Men-Tsee-Khang college in 1986 as part of the fifth batch of medical students. He expressed an interest in the pharmacy, and was one of the two students of his year chosen by Tenzin Namgyal because of his hard-working attitude during herb collection excursions. He worked in production continuously for more than seven years and gained considerable experience under his guidance and under Tenzin Chödrak. From 1997 to 2004 he started manufacturing Tibetan medicine independently as side work, but as he was transferred to the publication department, administrative work prevented him from continuing. He finally resigned in 2008 and started working in his private factory again. In 2009, he was appointed Visiting Physician to the Dalai Lama. In July 2012 his pharmacy became the first after Men-Tsee-Khang itself to register at CCTM after passing the inspection.

<sup>87</sup> Blaikie (2014, p. 286) reports that *khyung-nga* is also extremely popular in Ladakh, where the detoxification of *bongnak* includes 'several hours of constant grinding by hand while mixing in precise proportions of *arura* (*Terminalia chebula*), which neutralises its poison'.

*menchen*. Putting other things will lessen the toxicity.

JVDV: You only test the pills.

PT: Yes.

JVDV: Sometimes [if you sense a] burning feeling, then you know it was maybe too high?

PT: Yes yes, after half an hour or one hour if the toxic[ity] is high, then adverse [reactions] happen.

JVDV: What kind of feeling?

PT: The tongue and lips. And sometimes we cannot walk also, or cannot see well. Strong, sometimes very strong. People fell down.

JVDV: Have you seen that?

PT: Yes, many cases. It happened to some patients as well. Before you [the pharmacist, has to] check well, that is important. After giving it to patients, if there are some problems, then sometimes [the prescribing] doctor will taste.

JVDV: Also in Men-Tsee-Khang they had this problem in the past, I heard?

PT: Yes, many times. So, the doctor who compounds should check well, be very careful, that's important.

Experimenting with black aconite and Garuda-5 is clearly not without danger to pharmacists and patients.<sup>88</sup> In case adverse effects do occur, Tibetans may have some noodle soup (*thukpa*) or yoghurt and take a rest. If they complain to the practitioner, the dose may be reduced (e.g. only one or two small black pills instead of three or four).

### 5.3.2 Pharmaceutical production as a purification process

Here I will briefly outline the main steps in the manufacturing process of *rilbu* at Men-Tsee-Khang's pharmaceutical department. This may be read in tandem with Chapter 3, where PADMA's production line was described. Then, I will provide some more detail on one particular production event of Garuda-5 that I partly observed and discussed at length with Penpa to illustrate the specificity of this formula. The making of Tibetan medicine can be interpreted as a stepwise process in which potency is maximised while toxicity is minimised.

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<sup>88</sup> As was put forward by Etkin (1992), indigenous healers have been known to use 'side effects' as dosage markers. In Chinese medicine, boiled aconite roots are also reported to be tested traditionally through taste: the absence of tingling and numbing sensations from trying the decoction implies they are ready for use (Nyirimigabo et al. 2015).

Currently, Penpa's main role in the pharmacy is to decide when certain formulas are to be compounded and to supervise the whole procedure (Notebook VII). Most of the around 170 medical formulations are produced only once a year or less, but a few very popular ones – such as *Agar-8*, *Agar-35*, *Dashel-37*, and particularly 'Ma 3' (sold as a granulate in typical herbal tea packaging) – up to three or four times a year. The pharmacy employs more than sixty staff, including a handful of *amchi* and three laboratory analysts. During the productive time of the year (outside of the Winter and Monsoon seasons), the pharmacy workers operate in shifts from Monday to Saturday, 7 AM to 6 PM. During this period, the grinding and sieving of raw materials, and the rolling, coating and drying of pills are daily activities. Before raw materials can be used as ingredients, they first need to pass by the pharmacy's cleaning section where unwanted parts and foreign materials are removed by various means, including washing, manual sorting and separation of heavy and light particles using air ventilators. This is the most labour-intensive production step, providing work for up to twenty people.

The actual formulation of a new medicine usually started at Penpa's office. He copies the sequence of ingredients and amounts from a previously produced batch record onto a new product ingredient list <sup>89</sup>, ensuring a continuity in Men-Tsee-Khang's production independent of external written sources. A duplicate list is then presented to the manager in charge of the store section, who maintains a storage register and organises workers to gather the necessary bags of materials. Labourers from the cleaning and store sections work together to weigh the needed quantities of each material, which are poured out and mingled on a large canvas sheet and then transported to the grinding section (there are two 'pulverizing and sieving rooms'). There, the crude materials are first ground together coarsely, and then as increasingly finer powder in two or three steps. The powder is again bagged, and after sieving (the finest mesh is 100 micron) it is ready to be rolled into pills at the coating section. This is the second-most labour-intensive section. Up to a dozen

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<sup>89</sup> This list is not exhaustive in the sense that very small quantities of ritually blessed and empowered substances (see Kloos 2010 p. 112-126) are sometimes added to these *sensu stricto* formula ingredients later on during the pill rolling process, dissolved into boiled water. At this point and during pill coating, other supplementary components may be added as well, for instance to affect pill colour (mostly red, yellow or black), to improve powder coagulation, and to put formula ingredients in decoction (*thang*) or solid extract (*khenda*) form. The different coating decoction mixtures vary from pill to pill.

workers are active in a repetitive procedure of adding increasing portions of powder and boiled liquid together in a rotating stainless steel barrel (also called coating pans, five of these are available), which first generates 'pill seeds' (*rilsön*, smaller than barley grains). These pill seeds are then partially dried on low wooden frames covered with cloth before the barrel procedure is repeated to add bulk to and coat the pills further. When the *rilbu* reach their standard size, they are made shiny by rotating them once more and then size-checked. A lot of effort goes into ensuring uniform batches of equally sized and coloured, round pills. Size sorting machinery (as observed by Saxer 2013, p. 78) is available and has been used in the past by Men-Tsee-Khang, but *amchi* consider the results inferior to manual sorting which also makes it easier to attend to different pill sizes. A similar assessment is made for the oven-type equipment used to dry pills. Even though it is much quicker than air-drying outside or inside, it is not a preferred option as it may reduce the potency. The final drying session takes two to three days, depending on weather conditions. When fully dried – which is checked by manually testing pill hardness using the teeth and confirmed in the laboratory, where hardness and moisture content are quantified – the pills are bagged and transported to the counting and packaging section. There, they are counted and sealed into food-grade plastic bags of 1,000 dosages (usually 3,000 pills) and put in larger sacks of 20,000 dosages. Finally, the sacks are kept in the medicine sales and store section from where they are dispatched to branch clinics upon receiving an order. It is useful to provide some more numbers to get an idea of the size and intensity of this operation. For example, more than seventeen tons of raw material were purchased by the department and more than thirty batches of different pills (about one every two days) were manufactured in the peak production time I witnessed from April to May 2014 (Notebook IX). The hugely popular *Agar-35* formula is compounded at least two times a year, and on April 22<sup>nd</sup> 667 kg of raw materials were made into more than five lakhs of pills (i.e. more than half a million daily doses).<sup>90</sup>

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<sup>90</sup> *Agar-35*, or 'Eaglewood-35', is of particular interest not only because of its popularity as a gentle and safe treatment for *lung* disorder and upper back pain amongst others (Tsarong 1986), but also because it is one of the formulas that contains all four of the herbs that are the subjects of this dissertation. While the amount of each component is relatively small in this formula of thirty-five ingredients, the potentially poisonous aconite only accounts for less than one percent of the total weight.



Figure 5.6. The main steps of *rilbu* production at Men-Tsee-Khang, left to right and top to bottom. Pre-processing (manual sorting of *pangpö*), weighing and compounding of raw materials (in this case *Tikta-8*), grinding, mixing, pill rolling, size checking, drying (*Agar-35*), and counting, labelling and packaging. Photographs taken by the author, Spring 2014. Courtesy Men-Tsee-Khang.



On February 27<sup>th</sup> 2014, 634 kg of Garuda-5 was compounded under Penpa's supervision, following the recipe outlined in Tables 5.1 and 5.2 in the first section of this chapter. Afterwards, we discussed this particular production event in considerable detail (Audio recording 90). *Aru*, the principal ingredient, was first cleaned by blowing off the dust from the fruits using a large fan and then by carefully picking out the seeds and other foreign materials by hand. *Ruta* was also dusted first. The 'outer bark' (cortex) of this root is generally not removed, although practitioners are aware that this is the best practice prescribed in the texts. This would require a lot of extra labour since large volumes of it are used in many compounds. If they are very muddy, the roots are washed with cold tap water. The pre-processing of *shudak* roots is identical. Arriving at the third ingredient, *menchen*, Penpa noted that: 'This time we put not so much, because it is very strong energy. [...] These days first we have to clean it, then we have to boil it for a little bit to reduce this... How to say... Potency, yes maybe *duk*.' This quote points to the slippage or partial overlap between potency and toxicity. It also highlights the perception and manipulation of variation in pharmacological action. Aconite root is the only ingredient that needs proper *dukdön* in this formula. Senior pharmacy doctors advise on how long the roots should be boiled depending on the nature of each batch and based on their experience. The fifth formula component, *gulnak*, is purchased as a resin that is added as a decoction at the time of pill rolling. When he explained to me that the typical dark black colour of the *khyungnga* pills is based on detoxified 'iron powder' (*chakché*), I was puzzled. Only after going over the process several times and after a good laugh about magnetic Tibetan pills did I come to realise that iron is actually not added directly to the medicine. Solid iron powder is put in boiled water with *aru* powder for seven to ten days. The *aru* absorbs the *nüpa* of iron, becoming very dark in colour. The iron is then drained out using a magnet, and the remaining powder (*chaktsi*, 'iron essence') is dried and later added to the pill coating decoction.<sup>91</sup> When the pill coating is finished, the tiny black pills are dried outside in the sun like all medicines (except precious pills containing *ngülchu*, or if the weather does not allow it). Since the pills are small, they dry more quickly than usual.

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<sup>91</sup> The practical procedure for making *chaktsi* is briefly described in Dawa (2003, p. 399).

In the practical context of *menjor*, safety and being free of side effects is not a given but the ideal result of a complicated series of carefully executed procedures. As Cardi (2005-2006) details, Tibetan practitioners regard single-ingredient herbal medicines as inferior in efficacy and potentially harmful compared to multi-compound formulas where the therapeutic actions of the ingredients are coordinated, potential harmful effects balanced out, and where composition may be adjusted to individual patients. Throughout the entire procedure – which takes place along the lines of the *Seven Essential Limbs* and involves gathering the raw materials, drying, storing, pre-processing (*dukdön*, including cleaning and more complex detoxification practices), grinding into powder, mixing, rolling pills and finally drying again (at least at Men-Tsee-Khang, see Blaikie (2014) and Saxer (2013) for more details on the different steps in other places) – the aim is to obtain a potent medicine that is also ‘smooth’. The coarse potencies of the ingredients are eliminated through cleaning and detoxification to prevent hampering of the patient’s ‘digestive fire’ (*méd-rö*). The medicine is then further made smooth (*jam tselwa*) by adding supportive ingredients that counteract unwanted effects and protect certain organs if needed. Related to this, Blaikie (2014) observed that many Ladakhi *amchi* (as well as Tibetan *amchi* in China) are suspicious of factory-made Tibetan medicines as it is impossible to know precisely – and thus prescribe appropriately – the contents and properties of formulas not made by themselves. From a Tibetan medical viewpoint then, unwanted effects are likely to arise if the medicines have been poorly manufactured. However, ‘the suitability of a medicine can be completely assessed only by matching it with the patient, his general health state, age, behaviour and gender’ (Cardi 2005-2006, p. 98).

### 5.3.3 *Khyung-nga* in Gangkyi clinic: personalised prescription as a safety buffer

I sat next to Sonam Wangmo<sup>92</sup> for a few hours on a weekly basis from April to May 2014 (Fieldnotes VII-IX), observing doctor-patient interactions in consultation room C3 of the

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<sup>92</sup> *Amchi* Sonam Wangmo was born in Sikkim. She was inspired to become a Tibetan physician through the example set by her great grandmother, and after watching a ‘lady doctor’ on television when she was young. She moved to Dharamsala to join the tenth batch of Men-Tsee-Khang medical students, and finished her Kachupa studies in 1999 after a one-year internship at Gangkyi branch clinic. After ten years of clinical practice, she obtained the Menrampa degree at Men-Tsee-Khang college. In 2014, she already had more than fifteen years experience in Tibetan medical diagnosis and prescription. She was part of an official two-month clinical tour to Kazakhstan, and has also been privately invited by patients to Denmark and Germany.

Gangkyi clinic.<sup>93</sup> Sonam's full name is painted in Tibetan and Roman script on a green plaque above the door post, which is covered with a thin curtain that leaves little space for the privacy many Westerners are used to in healthcare settings at home. The room is decorated with a Men-Tsee-Khang Tibetan calendar and a photo of His Holiness. The regular patients were mostly middle-aged and elderly Tibetans<sup>94</sup>, but Indian tourists and groups of Europeans, Russians, Australians, Japanese and many other countries also frequent this clinic situated next to Men-Tsee-Khang college and close to the Central Tibetan Administration (CTA) (Audio recording 74).

A typical consultation lasts about ten minutes, or even less for regular patients, and proceeds as follows. The patient comes in, sits down at Dr Wangmo's office table, and hands over their medicine prescription booklet (*mendep*). The amchi looks at the first page for the patient's name and age, and then consults the last written page to see which medicines were prescribed at the previous consultation. The patient explains her current health status in a few words and/or the doctor asks a few short questions. The pulse is read from both wrists during half a minute of focussed silence, after which the doctor may generate some more observations and questions to be confirmed by the patient.<sup>95</sup> A few pieces of dietary and behavioural advice are provided such as 'eat less butter and greasy foods' or 'dress warm and avoid cold and damp places'. Pills are prescribed for morning, lunch and evening time on a receipt to be given to the cashier and dispensary. Patients above sixty-five years of age and CTA and Men-Tsee-Khang staff members and their families are treated free of charge. Monks, nuns, and poor people (including newly arrived refugees) get a concessional rate at half of the normal charge, which is already cheap (100 rupees or 1.5 USD consultation fee and about 10 extra per day for the pills) compared to biomedical

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<sup>93</sup> This branch clinic was the tenth to be established (in 1983) of the fifty-nine operating clinics established by the end of 2015. It is equipped with a dispensary, cashier, three consultation rooms and several wooden benches for the queuing patients.

<sup>94</sup> See Prost (2008, p. 43-53) for a list and discussion of diseases and disorders prevalent in the exile community and their purported causes, and for the link with social inequalities between different generations of (migration of) Tibetans (p. 54-73).

<sup>95</sup> Urine analysis is very rarely conducted in this clinic. As part of the diagnosis, Sonam also pays attention to skin complexion and occasionally investigates the eyes, tongue and finger nails of patients in more detail. Considering treatment, external therapies are sometimes performed, in specific cases and more as a last resort.

consultation and medicine. The *amchi* fills in the prescription booklet, signs the receipt, and also notes down the date, patient name and country, and the medicines down in a large record book.

I asked a number of doctors what *khyung-nga* is commonly used for, and the keywords I got back were ‘infection’, ‘inflammation’, and ‘pain’. Typical examples I was given were to keep one pill in your mouth in case of painful toothache, or to take a few against knee pain or acute headache caused by *sin*. Several *amchi* and patients referred to Garuda-5 as ‘a sort of antibiotic’ with the formula’s fast-acting antibacterial effects in mind. Personally, this activity range reminded me of common nonsteroidal anti-inflammatory drugs with analgesic properties such as Ibuprofen. During my time at the clinic, I witnessed more than a dozen cases where Garuda-5 was prescribed albeit only once in isolation. *Amchi-la* confirmed that lay people know that *khyung-nga* works, and they will specifically ask for it when in need. Tibetan medicines however are not usually prescribed as a single multi-compound formula consisting of processed and complex natural ingredients, but as a combination of formulas to be taken before breakfast, after lunch and after dinner. Garuda-5 in particular is one of the several formulas that is sometimes compounded and frequently prescribed together with others, to be taken at the same time of day: a third-order combination or compounding of compounds. This flexibility and complexity is required according to Sonam to treat contemporary problems and diseases, which have become more complicated. In contrast to nowadays, senior doctors in ancient times were very sure about their diagnosis and preferred to wait and see the effect of single formulas, which they may have prescribed three times a day for seven days.<sup>96</sup> I will now briefly describe two consultations I witnessed which included Garuda-5 in different configurations.

On a rainy and foggy morning, my spouse Wim went for a consultation with Sonam. He wanted to test the *amchi*’s pulse reading skill by not giving any information in advance. Feeling his left pulse, she enquired if he had sleeping problems. ‘Yes, sometimes I just wake

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<sup>96</sup> Penpa Tsering equally felt that *khyung-nga* is prescribed much more by Tibetan doctors nowadays, as bacterial and viral diseases have become more prevalent (Audio recording 110).

up here even if there is no sound.’ She feels his pulse on both sides. ‘You have a sore throat and sinus problems?’ Wim nods. ‘Very often?’ ‘Yes, I am sneezing a lot. I think it is a pollen allergy.’ The doctor focuses for a longer while, holding his two wrists. ‘Stomach, little indigestion?’ ‘Yes! That is a third problem, I have very irregular bowel movements here.’ We were both impressed by her accurate diagnosis. After thinking this over a few seconds, Sonam added that he may have ‘a little Giardia’. She asks if he has taken any medicine for that. The answer is negative. ‘Don’t eat eggs, papaya or spicy food like chili, rice is okay. Come back again after ten days for a check-up.’ The amchi decided to prescribe three *Mangjor* precious pills, a popular medicine indicated for gastro-intestinal problems due to poisoning and unaccustomed foods. These had to be taken in intervals of three days, and other medication should be suspended at this time. He was also prescribed one *Dashel-37* pill every morning for the stomach, and *Pangkhyung* – three *Pangyen-15* for the sore throat and to take out mucus, taken together with three Garuda-5 pills for infection and inflammation in the nose, throat and stomach – in the afternoon. After dinner it was recommended that he should take *Yuril-13* for the intestines, because stomach upset wakes him up at night and to balance the downward-clearing wind (*thursel lung*).



Figure 5.7. Wim’s medicine, prescribed by *amchi* Sonam Wangmo on 6 May 2014. The white sheet is the actual prescription; the blue one is the receipt given after payment at the cashier, which is stamped after receiving the pills from the dispensary. The *rilbu* are counted manually and packed in small plastic or paper bags (see Figure 5.8 for more detail). The three Mangjor precious pills are individually packaged and accompanied by a leaflet describing the main ingredients, indications, preparation instructions, cautions, and mantras to be recited. Wim experienced no adverse reactions as far as he was aware.



Figure 5.8. Detail of the *rilbu* prescribed to Wim. This photograph also shows the three different sizes of pills produced by Men-Tsee-Khang. The largest are around 1.3 cm diameter (black), medium size 0.8 cm (brownish), and the smallest (black, Garuda-5) about 0.3 cm.

Later the same day, an energetic seventy-year-old Indian woman from the nearby village of Sidhbari entered the consultation room while her husband waited outside. Dressed very youthfully and wearing strong perfume, she sat down and put her iPhone on the office table. She immediately started summing up her ailments in English interspersed with Hindi, with a serious skin disorder that had spread over her arms and legs at the top of the list. 'It is not psoriasis or scabies, an allopathic doctor said it was allergic eczema but I didn't want the cortisone. The skin peels off, but it keeps coming back. I take thyroxin every day. I took Tibetan medicine for years for bronchial asthma, it got better but was not completely cured.' 'And your blood pressure?' 'No high blood pressure.' After taking the pulse, Sonam noted that internal fever is present, a very hot pulse. The lady also had a *tripa* constitution. *Amchi-la* advised to avoid lemon and sour yoghurt. The patient was a strict lacto-vegetarian. Her sleep was bad; she wakes up every half an hour. Sonam summoned another senior

female *amchi* from the adjacent room to discuss the case. Together they concluded that there was indeed a chronic hidden fever and that *chuser* was disturbed. The doctor explained to the patient that because of her age, less strong medicines were advisable. Two different combinations of medicines had to be taken alternatively for this purpose, to reduce the dose. The medicines should be taken rather soon after eating, with hot water. To soothe the skin, *tripa* lotion (produced by Men-Tsee-Khang's separate herbal products department) was prescribed. After the patient had left, Sonam explained to me that taking high doses of strong medicine could result in low blood pressure, which may lead to fainting. These reactions are not considered side effects or even an 'overdose', but are interpreted as a consequence of prescribing medicines inappropriate for the patient's current state. *Thangchen-25* was prescribed in the morning time to purify the blood and separate the hidden fever from it. After lunch, *ngulchu-18* was prescribed to reduce *chuser* and to ward off afflictions by *naga*. Skin problems are commonly related to these serpent spirits (although this was not mentioned to the patient), and here *ngulchu* is particularly effective. Two combinations to be taken on alternate days were prescribed for the evening: *Gurgum-13* plus *Khyung-nga-nila*<sup>97</sup>, for the liver and impure blood, and to fight infection related to lymph respectively), and *Pökar-10* plus *Khyung-nga-nila*. The latter is helpful against itching skin.

#### 5.4 Poisonous medicines and medical poisons: potent substances, risk and the body ecologic

In this chapter, I have attempted to move beyond the simplistic application of the poison/medicine dichotomy to potent substances. In PADMA's Swiss and European scenarios, the potency of Tibetan medicines is marginalised as part of the 'complementary' herbal sector and through biomedically biased assessments of safety and efficacy based on risk/benefit ratios. Such evaluations further reinforced pharmaceutical regulations that cut

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<sup>97</sup> I was not able to retrieve the ingredients of this medicine from contemporary formularies. The pills have the same size and appearance as the Garuda-5 formula, to which some extra components are added to make it more effective against sores and skin problems (Penpa Tséring, Audio recording 110). Pasang Arya learned about *khyung-nga-nila* from the famed Tenzin Chödrak, and remembered that lapis lazuli (*mumen*, hence '*nila*' which is Sanskrit for 'blue') and purified mercury is added (Personal Communication, 6 August 2016).



off powerful plants like aconite from being used medicinally, rendering them obsolete. Aconite and its alarming alkaloids have been demonised while remaining a potential source for chemical drug leads. These are hindered far less in drug discovery trials and registration, relying on the separation of ‘main’ from ‘side effects’; side effects that haunt even the most ubiquitously used pharmaceutical. At the same time, medicines of Asian origin suffer from a bad image especially amongst health authorities and the biomedical establishment due to lack of evidence and in the wake of deadly poisoning scandals. Nonetheless, PADMA’s *Grippe-Formel* has been able to survive on the niche market of Appenzell Ausserrrhoden, a fragile *refugium*, which so far protects this formula from extinction.

Set at the foot of the Indian Western Himalayas, Men-Tsee-Khang has not escaped the ripples caused by the shockwaves of heavy metal contamination and poisoning by Tibetan and Ayurvedic medicines brought to light by laboratories and hospitals in Switzerland and beyond. These ‘facts’ notwithstanding, many Tibetan doctors continue to claim that Sowa Rigpa is side-effect free as long as it is manufactured authentically and correctly prescribed. It is clearly delusional and also epistemologically unfitting to expect Men-Tsee-Khang to implement a pharmacovigilance system or to start taking stock of ‘adverse reactions’ the way science-driven toxicologists would. On the other hand, given the data I have collected, it is also impossible to maintain that Tibetan pills do not have the potential to harm the patient. The more interesting question then becomes who takes responsibility for this danger, and how it might be averted by both doctors and patients. Garuda-5 presents us with a particular case in which a very popular medicine for inflammatory pain has brought about unintended consequences in some patients in exile, challenging dogmatic interpretations of classical medical texts and formularies. The formulation and actual production of *rilbu* can be seen as a step-wise purification/detoxification process that removes, transforms and balances out or ‘smoothes’ the useless, coarse and poisonous elements of *materia medica*. In the daily workings of the pharmacy however, practical experience-based decisions have to be taken on the exact details of this process. Which types of aconite can be used as ‘the great medicine’ (*menchen*), what amount, should the roots be pre-boiled or not? Different opinions and methods abound, but all *amchi* agree that extreme caution should be exercised. The *menjor* experts I interviewed further agreed

that the actual amount of aconite to be added depends on the strength of the raw material and on the strength of patient bodies nowadays, resulting in a considerably lower dosage than what is recorded in historical and contemporary references. The real danger then lies in the uncritical adoption of textual formulas by unexperienced producers, or not attending to the local ecologies of toxicity manifested in the interaction between Tibetan medicinal plants, skilled producers-with-machines (cf. Chapter 3), and the local biologies of patient bodies. In the clinic, practitioners diagnose the patient's constitution and imbalances of the elements and prescribe medicines as part of a larger treatment regimen that further considers intricate relationships with food and environment. Garuda-5 fulfils its medicinal role within this clinical encounter as a compound among compounds, which I described as another level of the balancing act that maximises its healing potential. If we approach the activity of potent substances as a multidimensional spectrum constituted by its contingent socio-material surroundings, there is no more need for a rigid poison-medicine opposition or simplistic dose dependencies.

As pronounced by Shepard (2004), a sensory ecology approach that recognises the interwoven biological and cultural dimensions of the role of the senses in medicinal plant selection, notions of aetiology and efficacy, and human-environment interactions in general is necessary to understand both cross-cultural similarities and differences. In his comparison of two rainforest communities in south-eastern Peru, Shepard (2004, p. 256) found that in both medicines are equally poisons but for divergent reasons: 'Unlike the allopathic notion of medicine-as-poison among the Matsigenka, Yora medicines are poisons not through opposition but through similarity – indeed, identity with the pathogenic agent'. The Yora thus construe efficacy in homeopathic terms in which medicine, illness and poison share the same spirit-related agency and nature as captured by the term *rao*. A similar notion is used for instance in South Africa:

The [Zulu] term *muthi* (spelled *muti* in Xhosa transliterations) derives from the Nguni root -*thi*, signifying 'tree.' Usually translated into English as either 'medicine' or 'poison,' with the anodyne 'herbs' used in ambiguous instances, *muthi* refers to substances fabricated by an expert hand, substances designed by persons possessing secret knowledge to achieve either positive ends of healing, involving cleansing, strengthening, and protecting persons from evil

forces, or negative ends of witchcraft, bringing illness, misfortune, and death to others or illicit wealth and power to the witch. (Ashforth 2005, p. 211-212)

The power of *muthi* is based on the mostly invisible agency of human-spirit-substance communication whereas the healing/witchcraft distinction is one of moral legitimacy and dependent on the motives of the user, expressed in white versus black *muthi* categorisation. But even healing *muthi* is often intended to bring death to the witch who inflicted the patient. This ambivalence is however being concealed by Post-Apartheid (1994) state efforts to reevaluate and regulate this often secret knowledge as 'African science', while eradicating witchcraft as superstition. This concealment of ambivalence also occurs in the public discourses of practitioners (as in *amchi* Jamyang Dolma's presentation, quoted above), and by means of the RCT apparatus (initially through the separation of main and side effects) and drug registration regimes. Although Ayurveda and Chinese medicine have separate words for 'medicine' and 'poison' just like Sowa Rigpa, it is now clear that this need not imply that their intentions and outcomes can be that easily distinguished.<sup>98</sup> In Tibetan medicine *men* and *duk* are formally distinguished and separately discussed in texts. Men-Tsee-Khang doctor Sonam Dolma (2013) for instance, heavily relying on classical Tibetan medical sources and contemporary commentaries, states that in general anything beneficial can be referred to as *men* in Tibetan language while anything harmful is *duk*, but that in Tibetan medicine and pharmacology both acquire multiple and more precise meanings based on the principles of elements, tastes and post-digestive tastes, potencies, and attributes.

But careful producers and prescribers of Tibetan medicines know better. A closer reading and observation of reformulation, manufacturing and prescription practices reveals that this distinction is fluid, contextual and relative. A rigid medicine/poison dichotomy simply cannot be maintained upon closer inspection, not even in modern Western toxicology. However, issues of medical toxicity – and the potency of aconite in the Garuda-5 formula in particular – are negotiated very differently in India and Europe. PADMA *Grippe-Formel*

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<sup>98</sup> For interpretations beyond the conventional poison/medicine dichotomy of historical Chinese medical texts, refer to the foundational work by Paul Unschuld (1975) and Obringer's (1997) analysis and comparison with the Greek term *pharmakon*.

cannot escape Swiss pharmaceutical regulation and its stringent logic of chemically-based risk analysis and pharmacovigilance, whereas Men-Tsee-Khang's *khyung-nga* is tied to classical textual ideals which are flexibly adapted to local bodies and ecologies through a diversity of practitioner-dependent practices. From a pharmaceutical risk-based population perspective it appears as if PADMA's Garuda-5 capsules are safer, come with less 'side effects' and thus have an acceptable risk/benefit ratio while Men-Tsee-Khang's little black pills could be riskier (but this will never be proven due to lack of interest and funds). While important, it is not sufficient here to only consider that the latter may not be EU GMP-produced and as stringently laboratory-controlled and standardised as explanations. The formulas have different compositions, include different herbs and Men-Tsee-Khang's Garuda-5 may contain relatively more than six times more aconite. The aconite itself has also been processed differently. Despite the potential issue of batch-by-batch variability which doctors may not always be able to control<sup>99</sup>, *Khyung-nga* is a very popular medicine perceived to be highly beneficial by both practitioners and patients in Dharamsala and beyond. Its reputed strong efficacy is well-known and handled with care. In this case perhaps the risk is higher, but most likely the benefit is too, pointing out a general loss of potent herbal substances in the West. But I argue that the very opposition between risk and benefit is misleading when considering the fluidity of and correlation between toxic and therapeutic effects. Moreover, we should take into account that the very definition of risk and choosing between risky options is a politically and economically infused, value-laden selection process that is contingent on subjective, individual comparisons with daily-life dangers. India and Switzerland are painfully contrastive life worlds in this respect. As Kadetz (2015b) proposed, we should not presume the universality of biomedical safety notions based on ethnocentric and paternalistic assumptions. Indeed, a critical *amchi* might contend that the over-the-counter availability of PADMA 28 (with its high camphor content) and *Grippe-Formel* comes with considerable danger to patients if taken outside the doctor-patient relationship that ensures attunement to local biologies, lived experience and insight into ecologies of toxicity (see also Schrempf 2015). Although biomedical definitions

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<sup>99</sup> Dr Paldjor who practices in Sidhbari (close to Dharamsala) for instance provides foreign patients with a small written note that advises them to discontinue the medicines and to consult a doctor in case a strong tingling feeling on the tongue or other 'uncomfortableness' is experienced (Barbara Gerke, Personal Communication, 20 May 2016). This seems to indicate that not only prescribing doctors but also those who manufacture pills are unsure how strong their medicines will turn out, not fully trusting their own medicines.

are spreading and hybridising with Asian medicines, safety, efficacy and toxicity remain situational, multi-dimensional concepts. The poison/medicine interface is not a dichotomy, it is an activity spectrum modulated by inextricable local ecologies of efficacy and toxicity.

## 6 *Gabur-25*: the regulatory reformulations of PADMA 28 and the European politics of ‘Smallalternative Pharma’

In a sense the journey of Tibetan Medicines to the Western world reached a new stage in 1969 with the foundation of the pharmaceutical company Padma Ltd in Zurich, Switzerland, which specializes in the manufacture of Tibetan remedies. Registration of medicines started right away. In a pioneering act the Swiss authorities granted drug status for Padma Lax in 1972 (‘formula 179’, Swissmedic Nr. 35872) and for Padma 28 in 1977 (Swissmedic Nr. 41125), both denominated as ‘Tibetan Remedies’. It has to be noted that in contrast to today's self-conception of Complementary and Alternative Medicine (CAM) in the 1970s this development is one constitutive factor for the birth of the CAM movement in Switzerland as it is found today (Rist and Schwabl 2009). From this point onward started the ‘modern’ tradition of a Tibetan pharmacology in Europe.

(PADMA’s CEO and Head of Regulatory Affairs, Schwabl and Vennos 2015, p. 110)

In this chapter, I directly draw on Laurent Pordié and Jean-Paul Gaudillière’s (2014a) concept of the ‘reformulation regime’, which was laid out as an overarching framework for this thesis in the Introduction. Combining this with critical works on drug regulation and through historical contextualisation, I aim to show how these aspects have impacted the transformations of PADMA 28: the best-researched and commercially most successful Tibetan proprietary medicine on the European continent. More than fifty clinical studies and overview articles have been published (of which more than 40% deal with atherosclerosis), and more than twenty experimental studies (PADMA 2015). In monetary terms, PADMA’s annual turnover is about ten million Swiss Francs, of which roughly 90% is related to sales of its lead product PADMA 28 (Herbert, Personal Communication, 19 August 2016). Spanning more than a century, the long journey of Tibetan medical

practitioners and their knowledge and the consecutive translations and transformations *en route* from Buryatia via St. Petersburg and Poland to Switzerland is a testament to the adaptability of the Sowa Rigpa knowing practice (Saxer 2004). This flexibility however, as noted by Schwabl and Vennos (2015, p. 109), ‘stands in contrast to the concepts of Western phytopharmacology and today's regulatory reality in Europe’. EU and national regulations enforce a ‘solidification’ of indications (reduction and standardisation, relying on clinical trials and experimental studies), a fixation of ingredients (in terms of Galenic form and posology), laboratory analyses of identity, quality and purity based on risk assessment, and strictly regulated packaging, labelling and communication with patients. In the case of PADMA 28, the ‘original’ *Gabur-25* from the Aginsky recipe book in Buryatia was reduced to twenty-two ingredients and several European substitute herbs were introduced, while the first modern labelled indication became ‘circulatory disorders with symptoms such as a tingling sensation, formication, feeling of heaviness and tension in the legs and arms, numbness of the hands and feet and calf cramps’ (English translation of Swiss Product Information for Patients).

On top of the multi-layered ‘pre-historical’ reformulations before its existence, PADMA 28’s transformation is continuing as the PADMA 28 product series expands and as it is introduced to other countries with different national and regulatory realities. In order to understand the regulatory reformulations of PADMA 28 in the European context, I first uncover some of its transnational ‘prehistory’ leading up to its (re)birth in Switzerland as a proprietary medical product. Next, I focus on two more recent reformulations to showcase the extended negotiations and occasionally far-reaching transformations involved in the adaptation of PADMA’s *Gabur-25* to other national contexts to reveal the macro- and micropolitics involved in this iterative medicine approval process. Austria is taken as a case study since a comparison between the market approval procedures in this country before and after the EU directive on Traditional Herbal Medicinal Products (THMPs) clearly illustrates the growing influence of supranational policies, and the opportunities and limitations they entail for Sowa Rigpa. I conclude by relating these findings to how PADMA positions itself discursively by deploying the trope ‘we are a small company’ and related statements of limited agency, contrasting these with the company’s pioneering political

role at the troubling interface of the EU's pharmaceutical and complementary industries. I contend that PADMA and its products, along with other similar companies, occupy a distinctively liminal position in the European regulatory, political and economic landscape as 'SmallAlternative' or 'Small and Alternative Pharma'.

### 6.1 A 'prehistory' of PADMA 28, and its first (re)incarnations

Before PADMA 28 was first registered as a medicine in Switzerland in 1977, it had already changed substantially in name, form and content as it traveled through time and space (Schwabl and Vennos 2015). A particular instantiation of the Tibetan 'Camphor-25' (*gabur-nyernga*) formula was first adapted to the Buryat environment in the eighteenth century, and later morphed into the Russian *камфора-25* as it was taken by *amchi* Sultim Badma to St. Petersburg in 1857 (Badmajew et al. 1982, Saxer 2004). Later members of the Badmajew<sup>100</sup> family then brought the formula through the Iron Curtain to Switzerland in the early 1960s, after producing and prescribing Tibetan medicines in Poland for several decades which were violently interrupted by the two World Wars. A numbered list of Tibetan formulas in Cyrillic script was handed over to the Swiss pharmaceutical industrialist Karl Lutz, on which *Gabur-25* was formula n° 28. The Badma(jew)'s twenty-eighth formula then emerged as PADMA 28, which also happens to contain the Tibetan transliteration for 'lotus' (*péma*).<sup>101</sup>

The history of Tibetan medicine in Buryatia, and its interactions with and introduction to Europe, and the role therein of the Badmajew family, has only been examined by few authors. Bolsokhoyeva (2007) discusses the development of Tibetan medical faculties

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<sup>100</sup> Saxer (2004) notes that Russian transliterations vary and that Badmajew family members spell their name in different ways: Badmaev, Badmayev, Badmajew or Badmajeff. All are (Russian-Orthodox) Christianised versions of Sultim Badma's second name, while the latter two are more typically Polish. I opt for Badmajew here as it is preferred by Peter Badmajew Jr. in his publications (Badmajew et al. 1982, Badmajew 2013) and because he was the one involved in the founding of PADMA.

<sup>101</sup> PADMA 28, PADMA's most well-known product name for its reformulated *Gabur-25*, confuses many Tibetan doctors because – in contrast to how Sowa Rigpa medicines are commonly named – the medicine's name does not indicate the lead ingredient (which is camphor, not lotus) and contains less than twenty-eight (or twenty-five) components. Although mentioned in Tsarong (1986), *Gabur-25* was never produced by Men-Tsee-Khang according to *amchi* Penpa, who checked the records and asked the long-time Head of the Pharmacy (Barbara Gerke, Personal Communication, 3 June 2016).



(*menwa dratsang*) as part of Buddhist monasteries in the Aginsk Buryat Autonomous Area. Tibetan medicine came along with Buddhism, both of which allegedly first reached the mostly nomadic, shamanic peoples inhabiting the region by a group of traveling Tibetan and Mongolian monks in the early eighteenth century. Successful treatments by lamas and doctors significantly contributed to the ensuing mass conversion of the local population to Buddhism by the nineteenth century. The first medical school was soon established based on the educational structure of the famed monastic Chagpori college in Tibet (see also Bolsokhoyeva 1999). Indeed, reports from pioneering scientific expeditions to Siberia by German-speaking scholars – starting with Daniel Gottlieb Messerschmidt (1685–1735) and Johann Georg Gmelin (1709–1755), amongst others – provide evidence of the early establishment, as well as the advanced surgical instruments and elaborate pharmacopoeia utilised by local practitioners of Buryat Sowa Rigpa<sup>102</sup> (Bolsokhoyeva 2007, Surkova et al. 2012). According to Bolsokhoyeva (2007), the monumental Aginsk formulary of 151 folios and nearly 1,200 medicinal recipes with specified ingredient dosages is still the most comprehensive and most useful reference for modern Buryat *amchi*. It was most probably written in the eighteenth century by Lozang Shérap (his Russian-Buryat name was Sumati Pradžnâ), a native Tibetan who resided in the area and who may have lived until 1799. The manuscript was published locally by means of xylographic woodblock prints in 1924. PADMA only managed to obtain a copy much later however – that is, after the initial registrations of PADMA LAX and 28 – from Donatas Butkus around 2000. In PADMA’s copy of the woodblock prints I was able to locate *Gabur-25* (Figure 6.1).

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<sup>102</sup> Tibetan medicine in Buryatia is a melange of Buryat folk medicine, Turkic and Mongolian influences, and the Buddhist medicine from Tibet. Tibetan and Mongolian knowledge were gradually adapted to local circumstances through original Buryat Mongolian translations of Tibetan medical texts and an extensive body of indigenous *materia medica* dictionaries and pharmacy books (Bolsokhoyeva 2009).

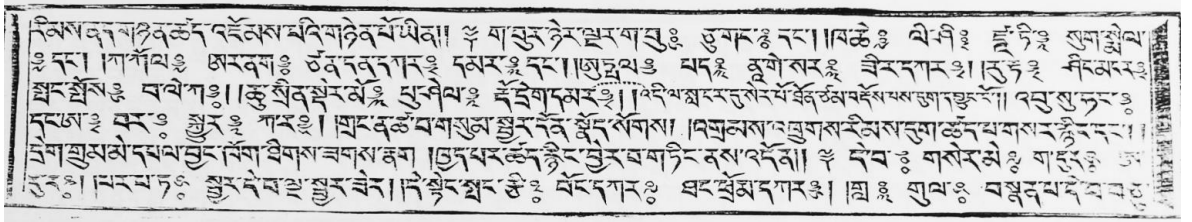


Figure 6.1. The recipe and indications for *Gabur-25* (*gabur-nyernga*), on the reverse of folio 31 of Lozang Shérap's *Amrita Extract Beneficial to All* (*Künphän Düdtsi*). The composition of the formula is tabulated below in Table 6.1. Here follows a translation of the other information provided. 'In case of cold illnesses, *Gabur-25* should be compounded with the addition of the three hot medicines. *Gabur-25* is indicated for dispersed, disturbed, and infectious hot disorders, fever caused by toxins, new and chronic fever in the solid and hollow organs, and gout, arthritis, erysipelas and pus in the chest. It is particularly effective for expelling chronic and dispersed fevers' (disease translations based on Drungtso and Drungtso 2005). An in-text comment on the ingredient *dodrek mar* further states 'for the removal of toxins, warm up in a pan until it turns yellow'. *Gabur-25* is listed under the heading of formulas that treat *béken* disorders, in the chapter on powder medicines.

In 2008, the entire work of Sumati Pradžnâ was translated into Russian by Dandar Dashiyeu, who took care to document the Buryatian substitutes that are in common use instead of relying on the substantially different – and more Tibet-centred – botanical identifications in Parfionovitch's *Tibetan Medical Paintings* (1992). Table 6.1 is a comparison of the composition of *Gabur-25* between the recipe mentioned in the final volume of *the Four Tantras* (which was available in its Mongolian translation in the early nineteenth century in Buryatia, and was translated and commented on by the Badmajews), the recipe prescribed in the Aginsky formulary, and PADMA 28's current Swiss composition. Although the botanical identification of Tibetan *materia medica* is itself a difficult and often problematic process (see Chapter 1), this painful commensuration exercise provides some insight into how *Gabur-25* came to be reassembled as PADMA 28. Nonetheless, this table also demonstrates the futility of such a comparative exercise, ignoring and solidifying the dynamism of the manifold historical struggles and reformulations involved.

**Table 6.1. Formula composition comparison of two key Tibetan texts with PADMA 28's current ingredients, provided with attempts at botanical identification.<sup>103</sup> PADMA 28 incorporates elements from both Men-Tsee-Khang and Buryat interpretations of *Gabur-25*, supplemented by alterations likely based on the experience of the Badmajew family and judgements by the Swiss Study Group for Tibetan Medicine and relying on the availability of Indian and European flora. Species in yellow correspond to the Men-Tsee-Khang interpretation (with lighter shade a documented substitute), blue to the Buryat situation, and green marks overall correspondence. An asterisk (\*) marks PADMA 28 ingredients mentioned in Kowalewski's (1973) list of Vladimir Badmajew's 'important plants'.**

<i>Gyūzhi Fourth Tantra Gabur-25</i> formula	Men-Tsee-Khang scientific identifications (Dawa 1999, 2009; Tsultrim Kalsang 2008)	Lozang Shéráp's <i>Amrita Extract Beneficial to All</i> (folio number 31, reverse)	Dashiev's (2008) Russian translation of the Aginsk recipe book (formula 290, p. 60): contemporary Buryat identifications	PADMA's PADMA 28 (derived from Badmajew's formula 28, scientific names adapted from Schwabl and Vennos 2015, p. 110)	mg/cap.	
1 gabur	<i>Cinnamomum camphora</i> (Linn.) Presl.	ga bu	006	<i>Cinnamomum camphora</i> Nees	<i>Saussurea costus</i> (Falc.) Lipschitz *	40
2 chugang	calcite	cu gang	020	<i>Bambusa textilis</i> McClure	<i>Cetraria islandica</i> (L.) Acharius s.l. *	40
3 gurgum	<i>Carthamus tinctorius</i> L.	kha che	007	<i>Crocus sativus</i> L.	<i>Azadirachta indica</i> A. Juss. *	35
4 dzati	<i>Myristica fragrans</i> Houtt.	li shi	008	<i>Eugenia caryophylla</i> Thunb.	<i>Elettaria cardamomum</i> (Roxb.) Maton var. <i>minuscula</i> Burkill *	30
5 lishi	<i>Syzygium aromaticum</i> (L.) Merr. et L.M. Perry	dzA ti	012	<i>Myristica fragrans</i> Houtt.	<i>Terminalia chebula</i> Retz. *	30
6 kakola	<i>Amomum subulatum</i> Roxb.	sug smel	017	<i>Elettaria cardamomum</i> Zhite et Maton	<i>Pterocarpus santalinus</i> L.f. *	30
7 sukmel	<i>Elettaria cardamomum</i> Maton	ka ko la	017	<i>Amomum medium</i> Lour.	<i>Pimenta dioica</i> (L.) Merr.	25
8 agaru	<i>Aquilaria agallocha</i> Roxb.	ar nag	010	<i>Aquilaria agallocha</i> Roxb.	<i>Aegle marmelos</i> (L.) Corrêa	20
9 tsenden karmo	<i>Santalum album</i> Linn.	tsan dan dkar	018	<i>Santalum album</i> L.	Calcium sulphate hemihydrate	20
10 tsenden marpo	<i>Pterocarpus santalinum</i> L.f.	dmar	013	<i>Pterocarpus santalinum</i> L.	<i>Aquilegia vulgaris</i> L. *	15
11 üpel ngönpo	<i>Meconopsis</i> spp.	u tpel	011	<i>Aquilegia</i> spp.	<i>Glycyrrhiza glabra</i> L. *	15
12 péma gesar	<i>Nelumbo nucifera</i> Gaerth.	pad	023	<i>Rosa</i> spp.	<i>Plantago lanceolata</i> L. s.l.	15
13 naga gesar	<i>Bombax ceiba</i> L.	nA ge sar	023	<i>Quisqualis indica</i> Lour.	<i>Polygonum aviculare</i> L. s.l. *	15
14 ruta	<i>Saussurea lappa</i> (Decne.) Schi.Bip.	zir dkar	018	<i>Lactuca scariola</i> L.	<i>Potentilla aurea</i> L.	15
15 zira karmo	<i>Cuminum cyminum</i> L.	ru rta	018	<i>Echinops dahuricus</i> Fisch.	<i>Syzygium aromaticum</i> (L.) Merr. et L. M. Perry *	12
16 baléka	<i>Aristolochia moupinensis</i> Franch.	shing mngar	018	<i>Glycyrrhiza uralensis</i> Fisch.	<i>Kaempferia galanga</i> L.	10
17 shingtsha	<i>Cinnamomum zeylanicum</i> Blume	spang spos	016	<i>Valeriana officinalis</i> L.	<i>Sida cordifolia</i> L. *	10
18 chusin dermo	<i>Selaginella involvens</i> Linn.	ba le ka	010	<i>Menispermum dauricum</i> DC.	<i>Valeriana officinalis</i> L. s.l. *	10
19 pusheltsé	<i>Dendrobium chrysanthum</i> Wallich ex Lindley	chu srin sder mo	013	<i>Selaginella tamariscina</i> (Bauv.) Spring.	<i>Lactuca sativa</i> var. <i>capitata</i> L. *	6
20 pangpö	<i>Nardostachys grandiflora</i> DC.	pu shel	012	<i>Iris flavissima</i> Pall.	<i>Calendula officinalis</i> L.	5
21 dodrek marpo	<i>Permelia tinctorium</i> Despr. (Dawa 1998)	rdo dreg dmar	018	<i>Girophora mullenbergii</i> Ach.	<i>Cinnamomum camphora</i> (L.) Sieb.	4
22 busuhang	<i>Medicago lupulina</i> L.	'bu su hang	010	<i>Medicago</i> spp.	<i>Aconitum napellus</i> L.	1
23 aru	<i>Terminalia chebula</i> Retz.	a	018	<i>Terminalia chebula</i> Retz.		
24 baru	<i>Terminalia belerica</i> Roxb.	bar	010	<i>Terminalia belerica</i> (Gaertn.) Roxb.		
25 kyuru	<i>Emblca officinalis</i> Gaertn.	skyur	012	<i>Emblca officinalis</i> Gaertn.		
extra kara	<i>Saccharum officinarum</i> L.	ka ra	040	<i>Saccharum officinarum</i> L.	excipients; gelatine capsules	

<sup>103</sup> | consulted Dashiev's (2008) Russian translation of Lozang Shéráp's recipe book with the kind combined assistance of Andreas Kunz (a slavacist) and Laura Rohs (an ethnobotanist specialising in Eastern Europe).

Let's have a look at the four plant subjects of this thesis, all of which are represented in some form in the table. As was noted in Chapter 1, *aru* (*Terminalia chebula*) seems to belong to a hard core of the Sowa Rigpa pharmacopoeia that is nearly impossible to substitute even though options are mentioned in the classical literature. The type of *aru* used may vary according to the formula (cf. Chapter 2, Figure 2.2), and while Men-Tsee-Khang takes care to remove the hard stones of the dried fruits this is not the case in PADMA 28.<sup>104</sup> In Buryatia a substitute for *ruta* is used that would not even be recognised by native Tibetans (as confirmed by Dawa 1998, translated into English in 1999), while PADMA opted for the endangered but cultivated roots of *Saussurea costus*. Several *Meconopsis* species are used in Dharamsala for *utpel*, but this rare alpine Himalayan herb was substituted by *Aquilegia* in Buryatia and adopted as such in PADMA 28. Again, this is a plant unknown to the Men-Tsee-Khang lineage of Sowa Rigpa. Lastly, *Aconitum napellus* is a very potent plant ingredient (cf. Chapter 5) present in PADMA's most successful formula even though it accounts for only one milligram. It remains a mystery as to whether this Badmajew invention is supposed to be a substitute, or for what reason it was added. One can also wonder why nutmeg, greater cardamom, white sandalwood, *Terminalia bellerica* and *Emblica officinalis* were not included as there exist few doubts on their identification. Sourcing difficulties may be one part of the answer, but the full story is sadly lost to history. Retrospectively, PADMA acknowledged that some translation errors might have been made in the early years (e.g. Audio recording 38). But they add that this is of no relevance in today's context as the formulas have solidified in regulatory documents and since PADMA 28 – as the most researched Tibetan formula on the planet (cf. PADMA 2015) – has been proven to work in clinical trials, experimental studies, meta-analyses, and through numerous patient accounts. Perhaps PADMA 28 is not deemed to be the classical, textual and traditional 'pristine jewel' by traditional scholars, but its contents are not arbitrary. It is a living artefact, which will likely continue to evolve in the future.

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<sup>104</sup> PADMA products that were developed in a later stage with the help of *amchi* Pasang Arya, such as NERVOTONIN (*sokdzin-chupa*) and HEPATEN (*drébu-sumthang*), do however use pitted fruits. This also comes with potential disadvantages as their removal raises modern quality issues such as an increased risk of microbial contamination as the fruits are broken (Audio recording 104).

The historical circumstances under which this reformulation – in effect an ethnopharmacological approximation exercise, described in Pordié and Gaudillière (2014a) by industrial Ayurvedic R&D researchers as ‘reverse engineering’ – took place deserves some more attention. The final steps taken by the Badmajew family from Poland to Switzerland and the difficulties and translations constituting the birth of the first PADMA medicines are described in more detail in a small book co-authored by Peter Badmajew Jr., his son Vladimir Jr. and free-lance writer Lynn Park (Badmajew et al. 1982) as well as in Martin Saxer’s Masters dissertation that accompanied his identically titled documentary (Saxer 2004). Based on these sources and discussions on PADMA’s oldest archival documents with Herbert (Audio recording 95-96), I attempted to reconstruct the ensuing story. Fleeing the Bolshevik Revolution, it was Vladimir Badmajew Sr., Peter’s father, who brought Tibetan medicine from Russia<sup>105</sup> to Poland in the early 1920s. In 1925 Vladimir Sr. opened a clinic in Warsaw, initially selling his medicinal preparations through the Gesner Pharmacy. Vladimir quickly rose to fame and could count two consecutive Polish presidents amongst his patients. Aided by these elite political connections the national government subsequently legalised the production of Tibetan herbal remedies. Saxer summarises the transformation process that ensued as follows:

Włodzimierz [i.e. Vladimir Sr.] tried to substitute the ingredients he couldn't find. As he kept track of his prescriptions it is possible to follow these transformations. First, in the 1920s he sometimes used things like caffeine or acetylsalicylic acid (aspirin) in his drugs. When supplies from India and China picked up he again adjusted the prescriptions. The remedies were still ordered and numbered according to Pyotr Badmayev's [his uncle's, the youngest brother of Sultim Badma] scheme, and the Polish authorities registered them under these numbers and their Mongolian names. The ingredients, however, were already figured as botanical Latin names. Włodzimierz started a semi-industrial production of Tibetan drugs. He contracted farmers to cultivate some of the herbs and built up a laboratory in Warsaw.

(Saxer 2004, p. 60-61)

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<sup>105</sup> Medicine in St-Petersburg of the 1850s was already governed by the early Latin *Pharmacopoeia Rossica*, which was published there in 1778 by the Russian Academy of Science. It contained 770 monographs of which 316 pertained to herbal preparations, and constitutes a unique blend of modern Western science and Russian folk-herbal traditions between West and East (Shikov et al. 2014).

Interestingly, the form in which the medicines were handed to patients also changed repeatedly: from fine powders in small paper wrappings in St. Petersburg (Saxer 2004), to tinctures dispensed by the Gesner Pharmacy in Warsaw (Badmajew 2013), to tablets produced by Vladimir's herbal laboratory from 1932 until it was destroyed during the Warsaw uprising (Badmajew et al. 1982). PADMA would later produce its medicines in tablet form as well until 2008, when a shift towards gelatine capsules (and later vegicaps in some countries) was introduced (see Table 6.2 below).<sup>106</sup> After World War II the new communist political climate meant it became increasingly difficult to practice. Vladimir was forced to re-register all his medicines. This was largely successful, but the Mongolian drug names were forbidden and not all ingredients were officially listed (Saxer 2004). After rebuilding his clinic and opening a second one in Krakow for more than a decade, he passed away in 1961, leaving his son Peter (who had become a fully qualified medical doctor and surgeon) as the sole heir of the Badmajew legacy in Poland. The political situation worsened further as the Polish authorities completely banned private herbal medicine distribution, shutting down the laboratory. Hoping he could at least keep his family's formulations available to patients, he approached and freely offered the recipes to the government-run industrial herbal company Herbapol on the condition that the products would specify 'according to Dr. Badmajew's prescription' (Badmajew et al. 1982, p. 18). The official declined this generous proposal. Although he had heard of these 'miracle cures', they did not comply to the strictly enforced state procedures.

A new stage in Sowa Rigpa's odyssey to the West unfolded as the Swiss pharmaceutical businessman Karl Lutz – who had become fascinated by Tibetan medicine after reading Korvin-Krasinski's syncretic Christian-Buddhist *Die Tibetische Medizinphilosophie* (1953),

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<sup>106</sup> PADMA switched from tablets to capsules because the latter requires less excipients (no binding agents necessary, so closer to original loose powder form) and because it increases the stability and shelflife of the product. From a classical Tibetan pharmacological perspective, however, formulas are generally formulated with a specific dosage form in mind (*Gyüzhī's* Fourth Tantra lists them in separate chapters). Each dosage form emphasises a different pharmacological principle: decoctions (*thang*) are for instance formulated based on the taste of the ingredients, powders (*chéma*) based on potencies (*nüpa*), and pills (*rilbu*) based on post-digestive taste (*zhujé*). This also influences their effect. Taste formulations are fast-acting and thus ideal for early and acute fevers, whereas post-digestive taste formulations are best for chronic disorders. This notwithstanding, nowadays Men-Tsee-Khang and other manufacturers in exile produce most formulas as rilbu as these are deemed more convenient to store, dispense and consume.

and attending a public lecture at Zürich's Polytechnic University by this Benedictine monk and ex-patient and student of Vladimir Sr. – invited Peter Badmajew Jr. to Switzerland in the summer of 1965. Over the next two years Karl Lutz and Peter struggled to source the necessary ingredients (mostly from India, via a company in London) and experimented for many days and nights in a small rented laboratory, working out procedures that could reproduce the quality and efficacy of Vladimir's medicines in Poland. When both men were satisfied with the result, Peter moved to the United States to build a new life for himself as a physician in Long Island, New York (Badmajew et al. 1982, Saxer 2004). This crude sketch of the knowledge transmission from a biomedical practitioner, who was the last to be part of an illustrious but waning lineage of Buryat Sowa Rigpa in Europe, to a pharmaceutical industrialist who genuinely valued its context and origins and their ensuing collaboration provides a sobering alternative to polarised debates on intellectual property rights. Instead of bringing accusations of biopiracy ('stolen knowledge') and the appropriation of tradition ('it's not authentic because it's commercial') to the fore, these instances of pragmatic yet carefully negotiated reformulation evidence the adaptability and ensuing transformations of Tibetan medicine(s).

More than a dozen of Tibetan remedies were produced and clinically tested on a very small scale under the guidance of the Study Group for Tibetan Medicine (*Studiengruppe für Tibetische Medizin*), which was founded by Lutz in Zürich in 1965, and aimed for the scientific promotion of *Tibetisch-Lamaistische Heilmittel* and culture (Badmajew et al. 1982, Kowalewski 1973). This group included the monk Korvin-Krasinski, Zürich pharmacognosy professor Flück (who co-edited the fifth edition of the Swiss Pharmacopoeia), a pharmacist (Dr. Andres Sr., who was also involved in setting up PADMA's quality control, see Chapter 4), a physician (Dr. Bubb), a drogist (Fritz Steiner), and others. They were attracted to the mystery of Tibet (as captured in Heinrich Harrer's *Seben Jahre in Tibet*, published in 1952), influenced by the Swiss psycho-analyst Carl Gustav Jung's (1875-1961) interest in Eastern philosophy and his integrative approach towards medicine and spirituality, and in touch with the leading European scholars of the time (including Fernand Meyer and Elisabeth

Finck). PADMA AG<sup>107</sup> was formed in 1969. Lutz immediately proceeded to register formula number 179 – one of Vladimir’s favourites for digestive disorders (Badmajew et al. 1982), which he had prescribed widely as a preliminary treatment for patients with a variety of problems – as PADMA Lax, which was accepted by the Swiss authorities in 1970. In the same year probably the first clinical study worldwide on a Tibetan remedy was published (involving 285 patients, on chronic constipation, Flück and Bubb 1970). This successful first recognition of Tibetan medicine by biomedical science led to further pioneering research on formula 28 at the Luzern cantonal hospital (Hürlimann 1978, on peripheral arterial occlusive disease), and the registration of PADMA 28 in 1977.<sup>108</sup> The next big leap for PADMA – the reimbursement of PADMA 28 by national health insurance in 1998, which was achieved shortly before the death of Karl Lutz after a decade-long battle which led to a court case – shows clearly how vested political, professional and commercial interests feed into medical decision-making. The start of this fight and the early involvement of the Swiss drug administration, the chemical industry, the Swiss Society for Angiology (who sided with the industry), and the media is hinted at in Badmajew et al. (1982), which quotes Karl Lutz himself on the matter. This quote is an ideal prologue to the still on-going negotiations between PADMA and regulatory authorities in different countries, and the larger struggle of PADMA as part of the CAM movement in Europe.

Whoever has the serious aim of introducing Tibetan medicine as a complement to the practice of scientifically oriented medicine has a hard and challenging task. Theoreticians and practitioners of medicine, pharmacologists, biologists and chemists, and generalists of both medicine and science all have difficulty accepting that herbal remedies can produce therapeutic effects that far surpass those of chemical preparations. That the ingredients in these remedies occur in such low dosages that they should by rights be ineffective and that they have no negative side effects only compounds their difficulty in comprehension. Anyone who knows the power of the chemical pharmaceutical industry and the extent of its influence

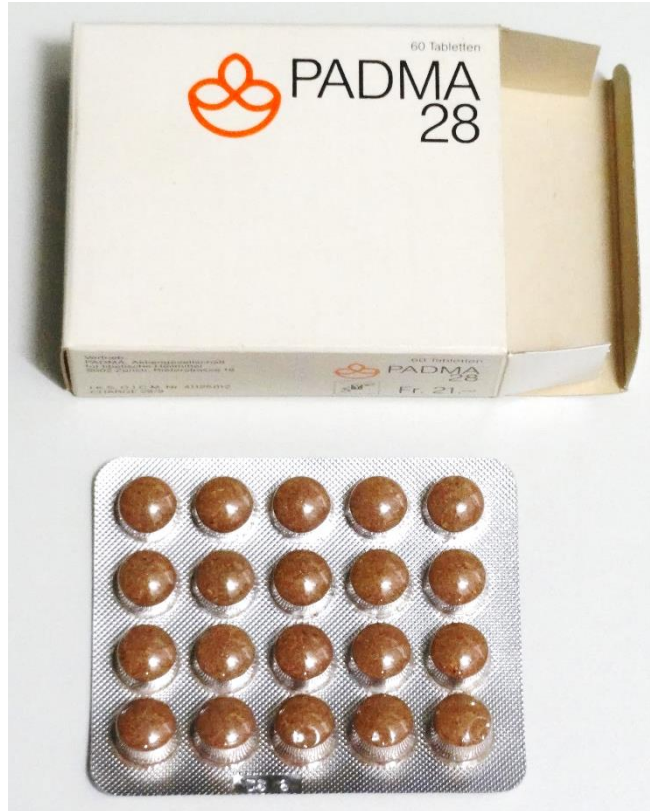
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<sup>107</sup> The original company name ‘PADMA AG für Tibetische Heilmittel’ (‘for Tibetan remedies’), was rejected by the Swiss authorities as the idea apparently sounded absurd to the ears of officials at the time (cf. Saxer 2004, p. 65).

<sup>108</sup> Based on PADMA’s archive and discussions on some of its earliest documents with Herbert Schwabl (Audio recordings 95 and 96) it appears that the first application for the registration of formula 28 with the Swiss regulatory authorities (in 1975, with ‘PADMA Vas’ as product name) was rejected on the grounds of the suggested indications, which were found too strong. Reformulations can be short-lived.



on both scientific bodies and medical experts can easily imagine the resistance that these natural remedies will encounter. (Badmajew et al. 1982, p. 26-27)



**Figure 6.2. PADMA 28's original packaging, first used in 1977. One package contained three blisters of twenty tablets each. The package in the photograph is part of the fourth batch. Photographed by the author in PADMA's archive.**

The historical period just covered, from the nineteenth century until the 1970s, was one of fundamental transformations not only for Sowa Rigpa and PADMA. At the time when Sultim Badma – the founding father of the Badmajew family lineage outside Buryatia – opened the first Tibetan pharmacy in St-Petersburg in 1857, the Industrial Revolution led by the mechanisation of the cotton textile industry had already swept across continental Europe. Founded on a newly created federal constitution (*Bundesverfassung der Schweizerischen Eidgenossenschaft*, 1848), the Swiss Confederation had already operated its own weaving mills since at least 1830, and by 1850 roughly 150,000 workers were employed in the cotton, silk, linen and wool branches (Fritzsche 1996). Although this *Baumwollwut* (cotton mania) did not compare favourably to the English industry competition-wise, other proto-industries such as workshop-based, high-quality watch- and clock-making dominated the

world market. The 1860s brought mass-produced condensed milk and baby foods (Heinrich Nestlé, 1814-1890), and in the 1880s chocolate became a Swiss trademark. In this period, the highly-specialised Basel chemical industry was born out of the production of dyestuffs and manned by graduates from the world-class Zürich Polytechnic (ETH, *Eidgenössische Technische Hochschule*), including the companies CIBA, Geigy and Sandoz (which all merged into the market-leading Swiss multinational Novartis in 1996). Another Basel pharmaceutical giant, Hoffmann-La Roche, was founded in 1896. As the next generation of Badmajews set up their practice in the Second Polish Republic during the Interbellum, the electrified technological production lines of the Second Industrial Revolution were running at full capacity: Roche became a leader in vitamin production and also developed Valium, whereas CIBA-Geigy became the number one synthetic dye producer and discovered DDT. Through mergers Sandoz expanded its food product range around the malted dairy drink powder Ovomaltine after World War II (Aftalion 1991). Besides this history of industrial and chemical revolutions, the so-called 'Swiss miracle' of post-war prosperity was clearly tied to its (armed) neutrality and the absence of war damage.<sup>109</sup> When Peter Badmajew first came to Switzerland in the 1960s, leading to PADMA's foundation in 1969, this country's neutrality, stability and national sovereignty had already amassed enormous wealth in its banking sector. Over the years it housed an increasing number of international institutions especially in Geneva, including United Nations agencies (e.g. the WHO, founded 1948), the World Economic Forum (1971) and the World Intellectual Property Organization (1974).

## 6.2 Regulatory reformulations post-1977

Switzerland joined the Council of Europe in 1963 and the UN only in 2002. But it was never and still is not a member of the European Union. The story of post-war European integration has often been told as a march towards peace and prosperity through the tempering of heroic nationalism, supranational governance and economic integration and as a calculated response to accelerating globalisation (Dinan 2014). As the Cold War

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<sup>109</sup> The importance of the pharmaceutical industry for the Swiss economy nowadays is still very significant and growing (Grass and Möhle 2015). Pharmaceuticals are the number one export (amounting to 71 billion CHF), and thus an important contributor to national economic growth. The combined directly and indirectly employed workforce is estimated at 224,266 persons or about 2.7 percent of the population.

intensified, a coalition of national (especially French and German) interests gave rise to the European Coal and Steel Community (1950) and later that same decade to the European Economic Community. The Monetary Union from 1999 onwards confirmed that economic integration remained at its heart. Europe's contemporary history is often interpreted as a directional, desirable, and inevitable development by progressive Euro-idealists, but the teleological distortion of this 'orthodox story' does not allow for more critical insights into its premises of exclusion, modernisation, bureaucratisation, capitalism and neoliberalism (Gilbert 2008).

With the above in mind, the Europeanisation of pharmaceutical regulatory policy and its aim to harmonise and create a unified European market for medicines has to be scrutinised (Abraham and Lewis 2003, Permanand and Mossialos 2005). Commencing with the first directive that established Community rules for medicine regulation in 1965 and later the simultaneous recognition of drug marketing authorisations in multiple EU member states in 1975, the European Agency for the Evaluation of Medicinal Products (EMA) was established in 1995. The mission of this 'virtual agency' however, consisting of selected national regulatory assessors, presumes Mertonian universalism<sup>110</sup> within regulatory science and that national political interests will be submerged into a single European epistemic community (Abraham and Lewis 2003). However, national regulators themselves were skeptical and feared a lowering of safety standards for the sake of commercial interests. According to Abraham and Lewis (2003) the conflicting aims of EMA (lowering healthcare costs, affordable drugs, wide access to high-quality medicines, and a successful industry), its technocratic approach and the creation of a single market together with the push toward more rapid approval times has ironically led to national inter-agency competition for 'regulatory work' and compromise on scientific review and transparency.

Davis and Abraham (2013)'s latest volume entitled *Unhealthy Pharmaceutical Regulation* takes the same issues forward. This time however, the work was explicitly embedded

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<sup>110</sup> American sociologist Robert K. Merton (1910-2003) drafted a set of normative ideals that ought to dictate scientific methodology. Universalism, the ability to evaluate truth claims in terms of impersonal, universal criteria, is one of these (Merton 1938, p. 267-278).

within the neoliberal era – which arbitrarily began with the rise to power of New Right politicians such as Reagan and Thatcher in the 1980s – and with the ‘light touch’ governance and the ensuing financial crisis of the financial sector in the late 2000s. Again, the observed deregulatory pharmaceutical reforms were supposed to simultaneously be in the interest of both industrial innovation (and thus commerce) and public health. State intervention was minimised at the behest of a competitive free market logic wherein informed/expert consumer/patients are fetishised. In this pro-business environment, the pharmaceutical industry gained privileged access to the state while regulatory standards were adapted to suit commercial interests. The governance space of the European knowledge-based economies – particularly in the areas of science, technology and medicine – was nonetheless typically characterized as ‘a golden era of regulation’ and a ‘world of standards’ (Faulkner, 2012). In this respect, not only science and society were being co-produced (Jasanoff 2004) but equally innovation and governance.

Table 6.2 lists the nine differently branded and packaged products that together constitute the current PADMA 28 ‘family’. At the time of writing this product series falls into five different legal categories and is available in fourteen different countries in three different compositions. Previous incarnations which are no longer produced and product registrations that were cancelled (as in Latvia, where it was not a commercial success) are not included. To narrow down the scope of this chapter I will focus on two historical instances of reformulation that have both taken place in Austria, which serves as PADMA’s springboard to the European Union. In section 6.2.1 I look at the negotiations that led to the national registration of PADMA 28 as a *Verzehrprodukt* (‘digestive product’) in Austria in 1992 before the introduction of the binding EU-wide 2001 legislation on the marketing authorisation procedures, manufacturing, labelling and packaging, distribution, advertising and pharmacovigilance of medical products for human use (Directive 2001/83/EC) and its amendment with special provisions regarding Traditional Herbal Medicinal Products (THMPs, Directive 2004/24/EC, 31 March 2004). In section 6.2.2 I then discuss the registration of PADMA Circosan as a THMP in Austria in 2010 (and three years later in the UK) to highlight areas of divergence.

**Table 6.2. List of all PADMA 28 family products currently on the market. Before 2008-2009, all were produced as tablets. Nowadays the only galenic forms provided are hard gelatine capsules and vegicaps (in Denmark and Italy). Products either fall under the jurisdiction of food or medicine legislation, which are implemented differently in different countries.**

product name	legal category	country availability (year of first, most recent registration)	remarks on composition
PADMA 28	OTC medicine	Switzerland (1977, 2008)	original PADMA 28 formula
PADMA Basic	food supplement	USA (early 1980s, ?), Poland (2005, 2008), Netherlands (?), Canada (2012), Hungary (2012), Bulgaria (2015), Estonia (2015)	without aconite
PADMA 28	well-established use	Denmark (1997, in progress)	without aconite
PADMA Circosan	OTC medicine	Lithuania (1999, 2011)	original PADMA 28 formula
PADMED Circosan / Arteria-vita	OTC medicine reimbursed on prescription (Swiss system)	Switzerland (2009) / Switzerland (2012)	original PADMA 28 formula
PADMA Circosan	THMP	Austria (2010), UK (2013)	without aconite
PADMA Plus / PADMA Basic Plus	food supplement	Denmark (2012) / Italy (2016)	Aquilegia -> Crataegus, Saussurea -> Inula (smaller amount), Sida -> Leonurus, Melia -> Phyllanthus, Kaempferia -> Zingiber, Potentilla aurea -> P. anserina, + Terminalia bellerica; vegicaps

In one of his papers, in which he builds on the notion of the reformulation regime, Pordié (2014) questions the *thinginess* (*la choseité*, referring to their solidity) as well as the claims of *objectivity* that are usually associated with things in industrial Ayurvedic innovation processes. The latter is posited to be as relative, dynamic and ephemeral as the former. Observing how Western regulatory environments directly determine the selection and development of formulations into products at the Himalaya Drug Company in Bangalore, he argues that the supposedly scientific objectivity of drug development is severely compromised and that this constraining of the ‘space of possibility’ (in terms of ingredients, galenic form, clinical targets, etc.) is usually omitted in published papers and corporate invention discourses. It is exactly this often unrecognised pervious and ephemeral nature of drugs which allows for consecutive transformations to take place, while retaining the same ‘ontological weight’. It is these regulatory reformulations that I want to discuss in the case of PADMA 28.

What is substantially different in the case of PADMA is not only the company’s location and medical tradition but more so the repeated, explicit and also public discussion of the insidious influences of pharmaceutical governance in PADMA-authored publications. This sustained narrative on the very real and complex negotiations with regulatory authorities (Schwabl 2009, 2013; Schwabl et al. 2006; Schwabl and Vennos 2015) which often results

in suboptimal compromise from the corporate perspective in terms of which products are allowed where, in what legal category and with what indications serves several purposes. First of all, it corroborates PADMA's long history of battles lost and won over the establishment of Tibetan medicine(s) in Switzerland and the larger, ever dynamic European context – thus legitimising PADMA's very existence – as well as its pioneering position in the registration of Asian polyherbal products. Secondly, this 'the limitations of chemical-pharmaceutical regulation' narrative is also a critique of the current *status quo* that is taken forward in national and European political struggles as part of the CAM movement. Lastly, this restrictive environment is also presented as an explanation and sometimes almost apologies to practitioners and patients of Tibetan medicine who want to know why more products are not available, why the Tibetan names and terms are not used, and why the classical formulas cannot be used as they are, and so on. The impact of regulations plays into identity politics, situating PADMA – sometimes uncomfortably – as a neo-traditional entity straddling East/West, alternative/conventional and (modern) traditional/modern divides.

#### 6.2.1 A pre-EU directive example: Austria's *Verzehrprodukt* in the Nineties

In the late 1980s, Herbert Schwabl first came in touch with PADMA and Karl Lutz as he was finishing his doctorate in physics. Schwabl's interest in quantum mechanics and other nonlinear phenomena as well as research by his department at the Technical University of Vienna on 'unexplainable' effects such the efficacy of homeopathy and other alternative therapies had brought the two men together. At a certain point, the PhD student enquired why PADMA 28 was available in Switzerland and Poland, but not in Austria (Audio recording 65). Lutz replied that this was a very complicated matter, but Herbert was not fazed by his warning and asked if he could try to get it approved in Vienna. Although finding a distributor who trusted him and the quirky Tibetan medicines turned out to be tricky, he started compiling the dossier to apply for a special Austrian type of food supplement status called *Verzehrprodukt* (loosely defined as a product that can be eaten without nutritional value). Herbert corresponded with an official from the Ministry for Health, Sports and Consumer Protection (*Bundesministerium für Gesundheit, Sport und Konsumentenschutz*) in the capital, and soon received a list of questions to which he in turn replied (Audio recording

96). This was at a time when Austria still had its own unique legal system and Viennese tradition of bureaucracy and diplomacy, before it became an EU member on January 1<sup>st</sup> 1995. Although this Tibetan multi-component formula must have raised some eyebrows, for the bureaucrat it remained just one amongst many other products.

Finally, after more than a dozen different versions of official letters with replies on specific issues such as reproducibility of the composition and toxicity assessments (reaching up to thirty pages, which Herbert remembered as tough but not full-on medical-scientific), he was formally introduced to the person in charge via an acquaintance. Luckily young Herbert was well-connected in his home country: his father-in-law 'was the secretary of somebody who knew somebody'. Even though the talks continued on a personal level, it was all official: 'it's a small country you know, it's not anonymous'. The final negotiation at the head of department's office lasted just five minutes. The official acknowledged Herbert's detailed argumentation – especially on aconite, which included seventeen subsections (from the quantification of alkaloids to the traditional uses of aconite roots) – and wanted to proceed, but on the aconite he simply replied in typical Viennese dialect: '*Vergessens es*', just forget it. From then it was clear he would get the product approved if and only if this herb was left out of the formula.

In this strict yet personal and consensus-driven environment, PADMA 28 was then approved as a *Verzehrprodukt* in 1992, without the aconite, and later renamed PADMA Basic. After Austria joined the EU, PADMA then attempted to re-register the same product under the name PADMA 28 as a medicine with well-established use (which involves providing evidence of at least a decade of systematic and documented use, as well as scientific studies, cf. Directive 2001/83/EC), but it was rejected. Elisabeth McHugh, who joined PADMA in 1997 and is the most senior employee at the Regulatory Affairs department, recalled that talks initially were favourable (Audio recording 103). The final stumbling block was that the authorities were of the opinion that the available clinical data were insufficient for a regular medicine, considering the medical claim. The application was withdrawn. In contrast, Denmark did accept PADMA 28 (again without aconite) as a well-

established medicine in 1997. But as the THMP Directive was on the horizon, plans were set in motion to apply once again in Austria within this new legal category.

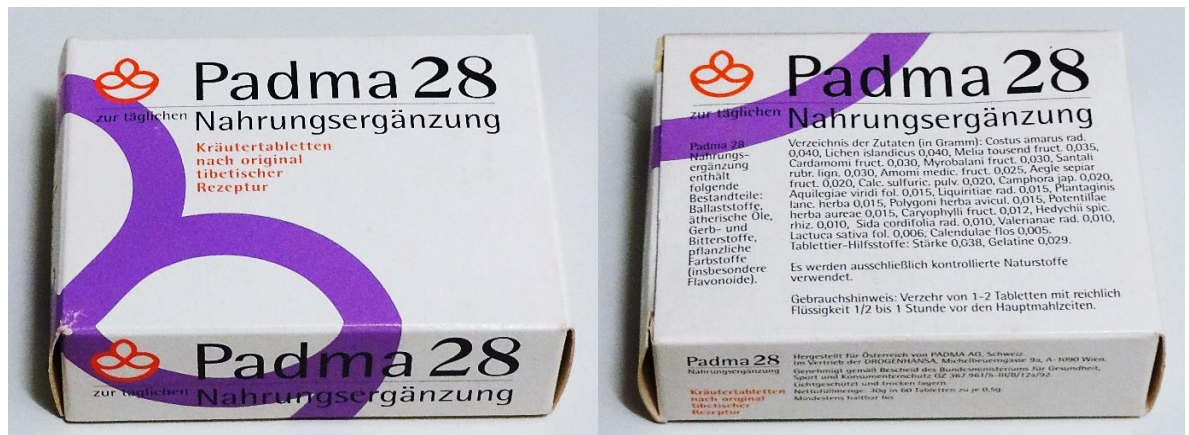


Figure 6.3. Austrian PADMA 28 of the early 1990s, registered in 1992 as a type of food supplement (*Verzehrprodukt*). Front and back of packages photographed by the author in PADMA's archive.

## 6.2.2 Traditional Herbal Medicinal Products (THMPs): PADMA Circosan in Austria (2010) and the UK (2013)

The new European Directive 2004/24/EC, also referred to the Traditional Herbal Medicinal Products Directive (THMPD), has come into full effect since 30<sup>th</sup> April 2011 following a seven-year transition period. Henceforth, the sale of manufactured unlicensed herbal medicines has become illegal in the European Union. Over-the-counter *medical* products (intended to treat diseases as opposed to food supplements which support and maintain healthy body functioning) thus need a licence via either a Marketing Authorisation or a simplified Traditional Herbal Registration (European Commission 2004, Schwabl and Vennos 2015). The new, last-mentioned option states requirements for: documentation of safety and traditional use – no clinical trials, which are replaced by evidencing historical usage over thirty years, of which fifteen within EU member states – and quality, labelling and advertising restrictions. Importantly, the indication is only based on long-standing use (rendering clinical research findings obsolete) and as stated in Article 16a (section 1, paragraph (a), p. 87) 'they have indications exclusively appropriate to traditional herbal medicinal products which, by virtue of their composition and purpose, are intended and designed for use without the supervision of a medical practitioner for diagnostic purposes



or for prescription or monitoring of treatment’. This amendment also established the European Committee on Herbal Medicinal Products (HMPC) under the European Medicines Agency (EMA) in London, which has produced more than a hundred community herbal monographs that specify the intended uses and patients of the herbal product under review, as well as safety information. This may then be freely used in well-established-use and traditional-use applications for registration based on the idea that the same data provided then does not have to be supplied over and over again by companies for these commonly used herbs. THMPs are by definition only allowed to contain herbal substances and preparations as well as some mineral ingredients with ancillary modes of action. Although the composition of the formulation may be derived from empirical (i.e. ‘traditional’) knowledge without the provision of a biomedical-scientific rationale (which is promising for Asian classical formulas, EMA/HMPC 2014) – the manufacturer is obliged to analytically show the presence of each ingredient in the finished product (EMA/HMPC 2007).

This sounds self-evident, but a multi-compound preparation (of more than twenty ingredients in the case of PADMA 28) pushes the limits of conventional techniques. Schwabl et al. (2006) trace the clash of this western-scientific rationale of analytical reductionism with poly-herbal formulations back to the controversial but influential Renaissance physician Paracelsus (see Chapter 5), who argued for the use of single herbs (the so-called *Simplicia*, medicinal ‘simples’) to treat specific conditions in the vein of Aristotelian mono-consequentialism. This penchant for mono-herbal remedies was then developed further in ‘rational phytotherapy’, which according to a popular handbook (Schulz et al. 2004) aims to ‘make medicines safer by isolating and modifying plant constituents’ (p. 2), evaluating ginkgo for cognitive deficiency, St. John’s wort as an anti-depressant, and so on. The search for isolated monocausal principles may be suitable for synthetic chemicals, but Tibetan formulas act as one pharmacologically active unit with polyvalent, pleiotropic effects (Schwabl et al. 2013). In the context of European medicine legislation there is indeed ‘no modern discourse without the atomic concept’ (Schwabl 2013, p. 191).

The word ‘traditional’ thus takes on a very specific, limited (and modern and standardised) meaning in this EU legislative context. Indeed, as Schwabl (2009) argues, the very definition – including the arbitrary spatiotemporal delineation of valid tradition – correlates with the rise of complementary and alternative medicine with its typical remit in prevention, living with chronic biomedical diseases and healthy lifestyles. Probably based on the WHO glorification of the integration of (the already re-invented) TCM into state-sanctioned Chinese healthcare, this brand of tradition nonetheless effectively excludes many non-European medicines with longstanding (but in this case irrelevant) histories from entering the market. In this more or less hostile regulatory environment, PADMA succeeded in obtaining Traditional Herbal Registrations for PADMA Circosan (a version of PADMA 28 without aconite) in Austria in 2010 (HERB-00037) and in the United Kingdom in 2013 (39568/0001). The Austrian registration is the very first time a complex Asian medicine-derived product was approved as a THMP in the whole of the EU. The first TCM product came two years later in the Netherlands – an extract of *Dioscorea nipponica* rhizomes in capsule form for the treatment of myocardial ischemia (Lindstrom 2012) – but consisted of only one herb known as a Chinese folk remedy. Only a handful of non-European products have been registered so far but many more are in the pipeline (Mader 2013).

Once again Herbert was involved in deciding if and where PADMA should apply for a THR license (Audio recording 98):

There are two aspects. One is the technical, ‘can you do it?’. We decided ‘yes, we can’. Second, ‘is the authority willing to?’. That was a negotiation with the Austrian authority. I knew that the person responsible came from the university, he was a professor of pharmacognosy before. He was really in love with plants one could say, someone who supports the whole field of herbal medicine. So he was the man to break the ice, so to speak. It was a coincidence that was in Austria, but there is also a good tradition of Austrian bureaucrats [from universities, with relevant expertise, not lawyers or chemists].

I was forwarded to the registration expert (Elisabeth, who spoke to me non-stop for nearly three hours, Audio recording 103) to get at least some feel for the complexities involved in this extensive administrative, legal and bureaucratic negotiation procedure. Having worked in this field for PADMA for more than fifteen years and having studied for two years on a

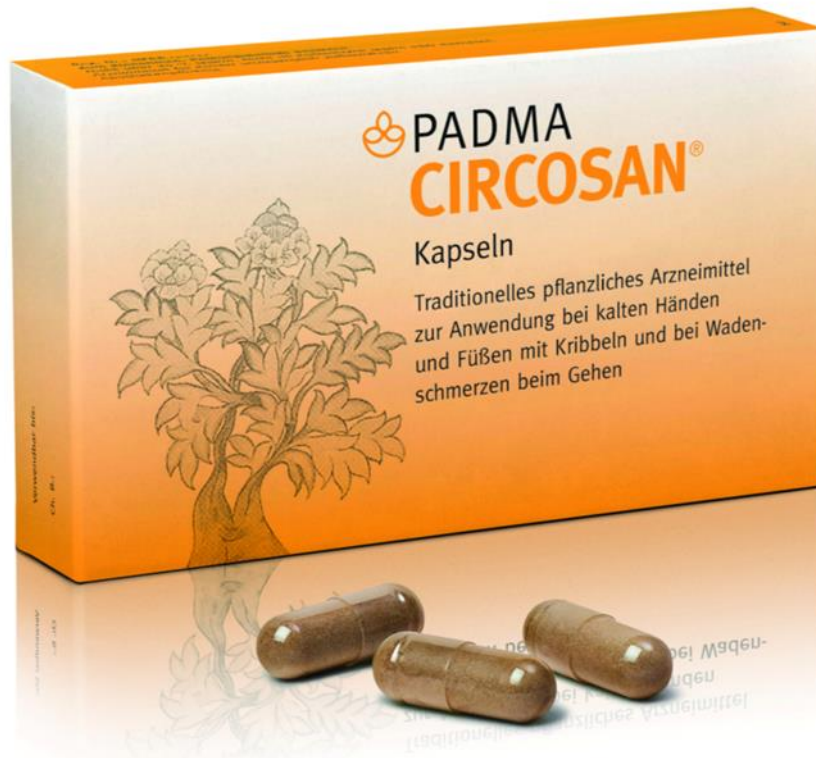
MA degree in regulatory affairs in Bonn, she was the perfect person to offer me a crash course. First she made sure I understood the distinctions between (1) legally binding legislation (such as the EU directives) and publications (the European Pharmacopoeia, the HMPC herbal monographs), (2) official guidance documentation that further specify how the laws should be interpreted (including EU 'notices to applicants' and EMA/HMPC guidelines) and (3) national (and individual assessor's) *interpretations* of these laws and regulations, because it is the interactions between these three levels that determine the maneuvering space. Although now the EU has exactly the same laws in all its member states for THMPs (but not Switzerland, which I do not go into further here), how they deal with it varies considerably. Before the European Commission stepped in the differences were of course even larger, but as yet licensing fees, distribution channels (e.g. pharmacy only or general sales), restricted herb lists, etc., have not been harmonised.

Politically, the British agency (the Medicines and Healthcare Products Regulatory Agency, MHRA) was at the forefront of getting the traditional directive going: the UK had several active medical traditions on its territory and many unlicensed products on the market, so the European commission was pushing them to set things straight. PADMA 28 Potentilla Formula (same composition, without aconite) was available 'exempt from licensing' before the EU directive, and PADMA was keen on extending the license. Talks were initiated and surprisingly, the main issue at the time turned out to be camphor. D-camphor (along with others such as menthol) was considered chemically too pure to be described as a herbal substance according to an HMPC statement. Removing this lead ingredient from PADMA's 'Camphor-25' was not an option. PADMA opted to express it as a herbal preparation (a solid fraction of the essential oil of the camphor tree) instead, but this strategy did not conform to the pharmacopoeia entry, which raised further difficulties. The Commission and HMPC were slow in responding to the many company complaints on this issue. MHRA did not know how to proceed, so PADMA's UK application was temporarily blocked. At the Austrian agency (then called AGES PharmMed) however, 'they were more courageous'. The old-school ex-pharmacognosy professor agreed camphor could be regarded as a herbal preparation and said it should be possible to find a solution (before any change in legislations and recommendations). PADMA then submitted the dossier there and only

later again in the UK, when they 'had gained a bit more self-confidence' and also changed their view towards these substances. A letter by Herbert to the European Directorate and a chance meeting in Brussels supported by a number of similar cases then led the European Commission to push HMPC to renegotiate the problem formally. It was finally harmonised with the publication of a report accepting entities such as camphor as herbal preparations provided they were from a natural source and tested according to the pharmacopoeia (EMA/HMPC, 2013).

A second hurdle to be negotiated was aconite. Here, both the Austrian and UK agencies firmly held their ground. They would not take the responsibility of having a 'poisonous herb' in a traditional medicine that is supposed to be harmless 'and you know, good for nothing really', Elisabeth added cynically. The counter-argument was that if a patient swallowed a large packet of sixty capsules, they could theoretically get alkaloid poisoning. PADMA regulatory affairs' people retorted that this is practically impossible, as one would start vomiting long before that. In my head I was comparing this to the potentially deadly consequences of ingesting a whole package of paracetamol, but this drug is in a different legal category and backed by clinical studies that shift the proven risk/benefit ratio (see Chapter 5). This battle was lost, aconite was removed.

A third point of contention was the indication. Although the proof for traditional use was accepted, the submitted suggestions based on this were found to be too strong. After writing back-and-forth for a few rounds, a simplified but broader indication was agreed upon in Austria which included some of the weaker symptoms for peripheral arterial occlusive disease (see Figure 6.4). Interestingly, this was not possible in Switzerland's over-the-counter products (where some additional, different regulations apply) as there it was argued a doctor would be needed to diagnose that disease. Somewhat related to this, in Austria PADMA decided to distribute Circosan to pharmacies only (not including *Drogerien*, which has a different status in Switzerland) whereas in the UK it may be found in supermarkets specialising in drugs.



**Figure 6.4.** PADMA Circosan, the Austrian THMP that was accepted in 2010 as the first one based on Asian medicine in the country and the first complicated multi-compound traditional herbal medicine in Europe. The indication translates as ‘cold hands and feet with tingling [sensations] and calf pain when walking’. Photo courtesy PADMA AG. Since 2015 a new package design was introduced in alignment with the package illustrations in Chapters 3 and 5).

It is impossible to go over all the details of this negotiation process, which is much more extensive (in the number and depth of arguments and documentation/literature reviews that have to be provided) and complicated (in terms of the number of guidelines involved) than hinted at here. To get an idea, as part of PADMA’s UK THMP application PADMA’s regulatory department received back a large volume with more than ninety questions from a team of quality, regulatory and clinical assessors, which was only the start of an exchange limited by deadlines (see MHRA 2013 for a public summary of the results). For the registration of PADMA Digestin – a much simpler five-ingredient formula (*Sendu-5*) – as a traditional herbal medicine in Switzerland the application project was started in 2006, the dossier submitted in 2008, registered in 2010, and finally marketed in 2011. It took two people five years, producing five large cartons full of paper. Even though the THMP directive was a much-needed and much-welcomed simplification of the registration procedures for traditional herbal medicines (which many argue should be amended further, Cranz and Anquez-Traxler 2014, Schwabl et al. 2015), PADMA employees feel that in a way

regulations keep getting stricter and stricter. With 2004/24/EC in place, it has become much more difficult to get a plant-based product licensed as a regular medicine even though it is still a legal option: 'Actually, the [Big] Pharma world managed to box herbal medicines into insignificance', especially from an indication point-of-view. There is no point anymore to conduct clinical research now (at least for THMPs), which generates a negative spiral of efficacy. This perceived problematic process of political exclusion leads us to section 6.3, where I go into the identity and macro-politics in which PADMA is active.

### 6.3 'We are a small company': being Small and Alternative (Pharma), lobbying Big

The founding of PADMA in post-war Switzerland of the 1960s and the subsequent spread of its products across a historically dynamic Europe clearly reflects a host of broader societal transformations. The commoditisation and scientific validation of 'traditional' or 'indigenous' knowledge – historically contingent categories that rely on a false tradition/modern dichotomy and that obscure the dynamic fluidity of situated practices and their appropriation by and of 'scientific' knowledge (Ellen and Harris 2000) – is a hallmark of globalisation, the cross-border intensification of economic, political and sociocultural relations (Alexiades 2009). More specifically, the shift over the last five decades towards postmodern 'late' capitalism, economic integration in tandem with regional specialisation and decentralised production, deregulation and neoliberalism has foregrounded a rhetoric of diversity and the development of specialised 'niche' markets in response to lifestyle choice demands. PADMA is a niche company which in its mass-marketing partly relies on this demand for de- and re-contextualised cultural commodities in postcolonial times, making it impossible for PADMA to ignore politics of knowledge and identity in terms of ownership, authenticity and scientificity.

In light of the on-going dismantling of the welfare state and the recent economic crisis, Big Pharma globally is reorganising its R&D and innovation strategies, particularly in the field of natural product discovery (David et al. 2015, Laird 2013). A succession of company mergers and acquisitions over the past decades has damaged the industry's competitiveness and ability to innovate, while drug patents are expiring and new market

launches are in decline (Scannell et al. 2012). Even though it is still the most research-intensive industry, and even though pharmaceutical markets are still growing (especially outside the US, Europe and Japan) and revenues are enormous, many internal R&D departments of large multinationals have closed down over the last decade as innovative research has shifted to – external collaboration with or acquisition of – smaller companies and (spinoffs from) academia (Laird 2013). Scientific and technological advances have made natural product research much faster, easier and cost-effective, but in today's business realities it has largely gone out of fashion. Furthermore, the focus has shifted from plants – in which interest surged in the bioprospecting 'green rush' of the 1990s with advances in automated high-throughput screening – to terrestrial and marine micro-organisms and the use of large, public-domain genome-based product libraries to find possible drug leads. Moving from organisms to genes, the role of traditional medical knowledge has declined further and the implementation of the Access and Benefit Sharing principles for genetic resources as specified in the Convention of Biological Diversity (1992) and the Nagoya Protocol (2010) complicated further. Nonetheless, herbal medicines have historically been of central importance and the current market for standardised phytopharmaceuticals is growing globally. New trends in poly-pharmacology, systems biology, personalised medicine and evidence-based phytotherapy aim to capture their multiple, synergistic effects.

PADMA is at the forefront of these cutting-edge developments (Schwabl and Vennos 2008, Schwabl et al. 2013, Zick et al. 2009), yet during my fieldwork there I noticed how employees and management in each department and on every level explicitly deployed notions of 'smallness' when explaining their work and PADMA's situation to me. Even in informative presentations addressing the public (e.g. at *Tibet Fest* in Basel, 16 August 2014), the limitations, struggles and frustrations of getting Tibetan medicines on European markets were emphasised. The context varied, but the message was consistent:

- In terms of the introduction of Good Distribution Practice (GDP): 'Because *we are a small company*, we cannot talk to the biggest guys because they are very expensive and offer solutions which are way too big for us. We have to find a transport company that is able and willing to deal with the small company we are' (Audio recording 48);

- Following up on regulatory developments: 'We have a regulatory service. We get e-mails of changes in European legislation that would affect us. Every day about two to three e-mails. We don't even have the staff capacity to read and understand all the legalities happening in Europe at a given time. For *a small enterprise* this is even not possible' (Audio recording 50);
- Purchasing raw materials: 'One thing is we don't have the systems here I am used to as a purchaser. *A small company* doesn't have the money for SAP<sup>111</sup>. SAP is for everybody who wants a good deal. It is one thing if you work in a big company if you have 2,000 sheets, but [with] an *Ablauf* [procedural] system. If you want to change this, you must have this, talk to this person... In a small company, a shit problem just happens and you just have to solve it' (Audio recording 52, related to this, there is the economies of scale problem in ordering small volumes of herbs);
- Risk analysis as part of quality assurance: 'so it's a risk for the company, a financial risk but not for the patient. But if you separate these two, it's too much work *for a company like us*' (Audio recording 63); Equally, when PADMA does GMP inspections with suppliers more than a hundred times larger than themselves, there are limitations (Audio recording 7);
- The lack of funding for large-scale marketing research (Audio recording 7), and for 'big clinical studies' (Audio recording 64).

This non-exhaustive list confirms that PADMA self-identifies as a small company, comparing itself and the efficiency of its operations to the leading multinational corporations – generated in the post-war and post-1990s era of globalisation, as discussed above – in both the herbal and chemical pharmaceutical industries. This disadvantaged position *vis-à-vis* Big or perhaps more aptly Global Pharma<sup>112</sup> also plays out in political arenas. PADMA is not just a small enterprise (around thirty staff, and an annual turnover of 30-40 tons of raw material or 10 million Swiss Francs), it is also located in a small country (less than nine

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<sup>111</sup> SAP is the leading information system for enterprise resource planning for larger corporations, a centralised database marketed by the German multinational SAP SE.

<sup>112</sup> According to Craig and Adams (2008, p. 6-7): 'Global Pharma is not simply about pills and profits; it is an index for bio-medical scientific legitimacy, a means of invoking official sanction for the sale of medicines and the authority to make claims about what medicines can or cannot do in an international arena. [... It] encompasses efforts to standardise and regulate the production of drugs, as well as the biopolitics inherent in how clinical trials are designed and funded, how subjects are recruited, results are read, and "risks" and "benefits" are characterised in the context of research, marketing, and clinical use.' These authors however include similar activities emanating from 'non-Western centres of science' as well as the articulation of 'complementary', 'alternative' and 'traditional' medicines under the umbrella of this term (which they admit is not unproblematic) whereas I prefer to analytically distinguish them as 'alternative pharmaceuticals' (see Conclusion).



million inhabitants, compared to 500 million in the EU), catering for one of the smallest traditions within the CAM community (with only a handful of immigrant amchi and only a few more than a hundred Europeans with some form of Sowa Rigpa training, Schwabl 2009). The CAM sector is itself minute in the total European economic context, even though CAM use has been substantial, widespread and growing from the 1980s onwards (Eardley et al. 2012, Harris et al. 2012). In one of our first conversations at his office (Audio recording 7), Herbert sketched PADMA's marginal as well as ambiguous position as follows:

We are in an environment. Here are the companies (he draws a circle on a piece of paper). We are part of complementary medicine (a section of the circle). From a top-down approach we are part of the pharmaceutical industry (another section). From the political point of view again we are borderline. We have the conservatives, and Left-wing. We would think complementary medicine would appeal to the Left and the Greens and the industry part would appeal to them [the Conservatives], but there are contradictions. Of course we are a pharmaceutical industry, but our company is too small for real Right conservatives. We calculated that the whole complementary medicine industry from the production side in Switzerland counts for 500 or maybe 800 employees. For the Right wing, forget it. Our section of herbal medicine in Europe has 800,000 employees, nothing! The Right says 'you are industry, but not important'. Complementary medicine could appeal to the Green parties, but the left has a stupid attitude, I would say, toward the consumer: 'the consumer has to be protected', they say. They say you have to prove [safety] with evidence, and CAM according to the standard talk has no evidence. For them we are also not good enough. Therefore, consumer protection agencies or associations are very often against complementary medicine because it has no evidence. The Right wing says it is the choice of the consumer. In terms of this – the liberal aspect that everybody has his choice – the Right are on our side. And from the industry point the Left wing supports us. We live in a complete mess politically. [...] We have this left and right dichotomy, we actually have to go to both with completely different agendas. And this is a problem of the industry, for the whole CAM trade.

In this sense, CAM is a double outsider: not fully Left nor Right-wing, not mainstream but still an industry. Within this industry it is small companies in particular that are struggling to keep up with pharmaceutical regulations. The big guys have an expert staff of lawyers and even have the capital to send out representatives to the regulatory agencies to be cued in to the latest developments. In a way, this upward spiral of increasingly intricate registration procedures and GMP standards helps multinationals to curb the competition

of those that cannot keep up in this rat race. Some separate regulations have been developed more recently for micro, small and medium-sized enterprises (SMEs), including the provision of financial and administrative assistance (EC 2049/2005) by EMA as well as the establishment of an SME office and user guide to facilitate communication with the agency during the application for an EU marketing authorization (EMA 2014). These European-level registration procedures however remain out of reach of PADMA's capacity, and generally do not work for multi-compound herbal substances with a 'non-scientific' composition. There are also concessions when it comes to GMP compliance such as the clarifications laid down in the Swiss Pharmacopoeia (Ph. Helvetica 11, 2012, section 21.1) on the production of medicines in small quantities. Especially in Switzerland, which has a lot of small companies, the authorities (Swissmedic) had to acknowledge that they cannot be dealt with in exactly the same way. Moreover, the Swiss constituency has repeatedly spoken out in favour of complementary medicine in this country through its direct democracy voting system (see following section), which has led amongst others to the adoption of national legislation to further simplify the registration of complementary and phyto-medicines (Swissmedic 2006), with a separate chapter on Asian medications which for instance accepts (traditional) bibliographical documentation as a rationale for ingredient combinations. These concessions notwithstanding, there is still generally a big bias towards Big and especially chemical Pharma, leading to Big-centric regulations.

Prevalent conspiracy theories notwithstanding, CAM critic Edzard Ernst (2008) notes that Big Pharma hardly takes any notice of complementary medicine, as can be inferred for example from its lack of interest in herb-drug interactions. Although a number of important conventional drug entities were originally discovered in plants (but now commonly derived synthetically) the drug discovery and development processes nowadays usually involve the screening of high-throughput chemical compound libraries with no or little direct ethnopharmacological input. The standard pharmaceutical business model is to find *new* chemical or molecular entities as promising clinical candidates and then to patent this innovation in the hope of securing twenty years of exclusive sales before generic competitors may be introduced. As traditional medicines with a documented historical use cannot be patented (except if novel uses and/or structures are derived from it, entering

into the ethical minefield of bioprospecting), large pharmaceutical companies would never be interested in producing a variation of *Gabur-25* or PADMA 28 even though they have the means to carry out the clinical trials (Audio recording 65).

The problem faced by PADMA however is the far-reaching influence of Big Pharma on politicians and regulators, leading to well-known (neoliberal) commercial, scientific and regulatory biases on their behalf (see Law 2006 and Goldacre 2013, as well as the work by Abraham cited above). Although not necessarily intentional, the impact of these Big regulations which presume the narrow applicability of classical chemistry and pharmacology on what I call Small Alternative Pharma is destructive. These ‘Smallalternative Pharma’ companies align with the CAM movement but are industrial, and manufacture non-chemically pure, non-sterile, non-patented products, the majority of which reaches the public through over-the-counter public sales.<sup>113</sup> CAM Pharma can thus be more or less clearly be distinguished from Big Pharma. This is where political activism comes into the picture.

### 6.3.1 Lobbying

As a small company on its own, PADMA has few if any reasonable options in terms of political influence. Companies are entitled to send letters to regulatory agencies such as the EMA HMPC (the Committee on Herbal Medicinal Products of the European Medicines Agency) or Swissmedic to bring broader legislative or regulatory issues to the fore, but the efficiency of this strategy is questionable. This was also evident to Herbert, who was affiliated to the Austrian green movement in his university years, where he adopted a

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<sup>113</sup> I acknowledge that the highly diverse and dynamic field of CAM is not that easily captured in rigid definitions. The Swiss company Weleda for instance (founded in 1921, headquarters in Arlesheim near Basel, main production in Germany) – ‘the world’s leading manufacturer of certified natural and organic cosmetics and anthroposophic pharmaceuticals’ (The Weleda Group and Weleda AG 2015, p. 2) – operates in over fifty countries worldwide, has a workforce of approximately 2,000 employees, and achieved a turnover of 364,3 million euro in 2014. The designation ‘small’ may seem unfitting here. Still, Novartis (also based in Basel) employed 118,700 people and had a revenue of more than fifty billion US dollars in 2015 (Novartis 2016). Novartis Consumer Health recently merged with Gebro Pharma into GSK-Gebro Consumer Healthcare GmbH, a market leader of the Austrian OTC market. The latter had earlier taken over the Swiss Alpinamed AG in 2000 which specialises in herbal extracts. So for now, Novartis owns a herbal company even though this was not their main intention. This is another example of the overlap between Big and ‘Smallalternative’ Pharma.

realist activist position of 'getting things moving' even if this meant sometimes compromising on ideals in practice (Audio recording 7). When he arrived in Switzerland with his wife Alexandra and started working at PADMA in the 1990s, PADMA was not part of any association. Over the years, Herbert managed to first get observer status at an association of homeopathic and anthroposophic medicine producers, which later expanded to the SVKH (*Schweizerischer Verband der komplementärmedizinische Heilmittelhersteller*) of which he is now the president; the 'Swiss Association for Complementary Medicines Producers' which currently has twenty-nine herbal companies amongst its members and falls under the larger umbrella organization Dakomed (*Dachverband Komplementärmedizin*).

Although therapeutic pluralism in Switzerland has been a topic of interest since the 1970s, the term 'complementary' only appeared in the 1990s as these practices became increasingly politicised (Martin and Debons 2015). Large research programmes evaluating CAM prevalence and efficacy, cost and implications of integration into health insurance were launched, such as the so-called *Programm Evaluation Komplementärmedizin* (PEK). Although the results that came out of this in 2006 were positive, the health minister had already decided to delist the complementary medicines from public health insurance, seemingly for political reasons (Rist and Schwabl 2009). In this context the umbrella organization *Forum für Ganzheitsmedizin* (in which PADMA and particularly Herbert took a leading role) was moved to set up a federal popular initiative in 2004 (*Ja zur Komplementärmedizin*) to let the public vote for increased state support; a unique aspect of Swiss direct democracy. After more than 140,000 signatures were collected, parliament prepared a slightly modified counterproposal *Zukunft mit Komplementärmedizin* for popular vote on 17 May 2009: 67% voted in favour. This proposal included (1) the re-inclusion of the five complementary modalities in public insurance (reinstated on probation for the period 2012-2017), (2) national diplomas for therapists, (3) integration of CAM into higher education (including for doctors and pharmacists), and (4) the installation of a simplified and less expensive registration procedure for complementary medical products. The proposal was passed and is being integrated into the constitution (although the extent of its effective implementation is still criticised by the CAM community), positioning

Switzerland as a pioneer on the European continent. In 2014, SVKH and Dakomed were once again using their political leverage to negotiate the contents of the new Swiss law on medicines (*Heilmittelgesetz*) at the Swiss parliament and government (Audio recording 51). Both institutions need to be lobbied: the former to influence the law-making process, the latter for its interpretation and execution. Although they could instigate members of parliament to raise a number of ‘nasty questions’, complementary medicine is constrained by a double bind: if too much pressure is put on the small herbal/traditional regulatory department within the drug authority they may be closed down altogether, which would be disastrous. In conversations between the agency and Big industry however, the tables are turned: politicians and regulators take care to create a good economic environment for these companies, otherwise they might leave the country and lead to significant unemployment.

To be able to negotiate with the health authorities in other European countries more directly and efficiently for the registration of its products, company management decided to create an Austrian branch called PADMA Europe a few years ago. As an EU member, Austria could then serve as a springboard to other countries as Switzerland is much more isolated politically from its neighbours. But again, for political purposes it was deemed necessary to overcome the enmity and differences between different CAM fields to work together towards common goals. EUROCAM therefore unites a number of European and international stakeholder organisations – including the European Herbal and Traditional Medicine Practitioners Association (EHTPA), of which the British Association of Traditional Tibetan Medicine (BATTM) is part (Holmes and Sweeney 2003) – to influence decision-making at the European Commission and Parliament. On the 27<sup>th</sup> of June 2013, Herbert travelled to Brussels for a parliamentary hearing on complementary medicine (Audio recording 6). He presented himself as a representative of ‘Swiss traditional medicine’ to overcome European power games within CAM between European and Asian traditions. Together with Michael McIntyre (who is still fighting for the statutory regulation of practitioners in the UK through EHTPA; McIntyre 2003, McIntyre et al. 2015), Herbert provided the input on herbal medicines. Based on the smallness of CAM in the European context, the general strategy is to unite ‘all the crazy people’, to become less of a fringe

group, as it would be deemed ridiculous to demand a specific Tibetan medicine legislation. There is a need for a clear and concise message as a united stakeholder group and to work on both long term (better legislation) and short term (better implementation of existing laws) aims (EUROCAM 2015). Big Pharma has its own lobbying groups. One example, which partially overlaps with the remit of CAM, is the AESGP (the Association of the European Self-Medication Industry) which represents European producers of non-prescription medicines, supplements and self-care medical devices. Although this organisation in principle covers the large majority of herbal medicines and although this association equally strongly recommends a more just evaluation of THMPs (Cranz and Anquez-Traxler 2014), it does not exclusively cater for natural products and also does not take on a CAM discourse. Much larger and chemical companies dominate this group, making it more difficult for alternative pharmaceutical companies to interact with them (Audio recording 54).

#### 6.4 PADMA, regulatory reformulation and innovation

PADMA legitimises its many adaptations of ‘classical Tibetan formulae’ on the grounds that pharmacy practices have always been dynamic and context-dependent, as do the Indian companies that drive Ayurveda’s reformulation regime. Yet, Pordié and Hardon (2015, p. 3) distinguish these mass-produced industrial reformulations which “begin in the minds of researchers and in drug company boardrooms” from ‘classical’ practices ‘on very small production scales’ which occur largely within the practitioner-patient interface. The prehistory of PADMA 28, however, unveils the problematic nature of this divide – as does Blaikie’s work – by sketching the manifold transformations, dynamic relations and unpredictable outcomes of the ‘discovery’ of this drug. Based on multi-sited fieldwork in China and Europe with companies and private practitioners, Schrempf (2015) relies on the same analytical categories. Classical Tibetan formulations are prescribed (and produced) by *amchi* according to Sowa Rigpa principles. Tibetan industrialised pharmaceuticals are mass-manufactured by companies adhering to pharmaceutical scientific validation regimes, are mostly prescribed by biomedical doctors, as well as targeting over-the-counter complementary and alternative, ‘natural’ and ‘herbal’ health and wellness niche markets.

Schrempf further distinguishes a hybrid polyherbal industrial formulation regime, exemplified by PADMA in her work, which generates multi-compound medicines and supplements consisting primarily of herbs (and few minerals) but excluding animal or metal ingredients. These reformulations are indeed the outcome of specific negotiations in-between Tibetan and biomedical notions and practices, the result of which defies explanations by both knowledge systems in isolation.

The pharmaceuticalisation of Tibetan medicines in Europe marginalises non-institutional 'traditional' agents and small-scale formulation practices (see again Schrempf 2015, as well as Ma 2015 for Korean medicine). In the European context, medicine and food regulations turn out to be determining factors in PADMA 28's multiple reformulations, an influence often downplayed by agents of commercial R&D (Pordié 2014). But PADMA openly laments the solidification that is the direct result of conscious efforts by the company to adhere to biomedical, pharmaceutical and regulatory standards (Schwabl and Vennos 2015). This partial self-critique is part of a bigger narrative that shapes PADMA's identity as a small company with limited agency which nevertheless – heroically, as in David and Goliath – takes up a pioneering role in the regulatory and political landscapes, lobbying nationally and internationally for a re-evaluation of the unfairly imposed restrictions on herbal remedies as part of the larger CAM movement. Carving out its own modern Tibetan-(Buryat-Russian-Polish)-Swiss tradition, PADMA is an innovation catalyst at the forefront of the Tibetan reformulation regime in Europe. This might be conceived as an honour, but more often it is a very mixed blessing as both the company and its products never seem to fit snugly into the Procrustean beds constructed by either the chemical-pharmaceutically dominated regulatory agencies or seekers of alternative or classical authenticity. This small, innovative Swiss-European niche company straddles in-between the chemical and alternative industries and their supporters and detractors from the Left and the Right, betwixt tradition and innovation, and East and West. It is a liminal institution that drives the reformulation of Tibetan medicine(s) towards new political, economic and regulatory frontiers while never leaving questions of identity and tradition behind.

# CONCLUSION

It is counterintuitive to formally conclude on something I consider to be perpetually in flux: the becomings of Tibetan alternative pharmaceuticals are not unidirectional, and never finished. Furthermore, in this translocal ethnography in-between Men-Tsee-Khang and PADMA there is no single, independent vantage point from which to make value judgements or predictions on the future of Sowa Rigpa. It would also not be enlightening to compare my initial working hypotheses with what was subsequently found, as my focus and with it my conceptual frameworks have themselves morphed from Appadurai's regimes of value, Wallerstein's commodity chains and Latourian actor-networks to Pordié and Gaudillière's 'reformulation regime', Ingoldian meshworks and ontologies in technoscientific practice. Each of the previous six chapters represents a different aspect of becoming, a cross-cutting layer of the on-going processes of reformulation that surface in each life stage – here both literally and metaphorically – of plants-becoming-medicines. Even though methodologically my aim was to follow some of the more salient life lines of four main herbal actors, I couldn't help but to get side-tracked and hopelessly entangled with the identities of *materia medica* (Chapter 1), Ayurveda-dominated markets (Chapter 2), pharmaceutical workers-and-machinery (Chapter 3), laboratories (re)constructing 'quality' (Chapter 4), the impasses of the poison/medicine dichotomy (Chapter 5), and with the regulatory politics of medicine registration and reformulation in the EU (Chapter 6). Nonetheless, I hope that these nonlinear diversions have served to illuminate the multiple and transitory nature of Tibetan medicines.

Tibetan medicines are both more and less than what is written in classical pharmacy records. The practical identification of their ingredients rest on particular equivalences based on situated knowing practices which do not always stand up to textual ideals (Chapter 1), especially when considering the ambivalent uncertainties of sourcing *materia medica* (Chapter 2). Through enskilled production a formula comes alive as an ecology of materials even within industrial settings (Chapter 3). In and beyond laboratories, these



materials co-produce a set of hybrid technoscientific ‘qualities’ (Chapter 4) that impinge on their spectrum of medico-toxicological potency when expressed in local biologies and social ecologies of toxicity through risk assessments, reformulations, production and prescription practices (Chapter 5). Tibetan medicinal recipes thus constitute dynamic assemblages privy to identity politics and moral economies. Their inherent multiplicity allows one and the same formula to manifest in innumerable similar but different avatars, as was evidenced by Blaikie (2015) for Samnor in Ladakh and Himalayan India, and for Gabur-25’s regulatory reformulations into the PADMA 28 product family (Chapter 6). Through my step-wise analysis of the manufacture of Tibetan alternative pharmaceuticals, I thus simultaneously denaturalise salient features of ‘Global Pharma’, contributing more broadly to medical anthropology and critical analyses of drug production.

#### A conclusion amongst conclusions

Along my dwellings and wanderings in-between India and Switzerland, I never lost track of four excellent and recent doctoral monographs on Sowa Rigpa: Kloos (2010) on cultural survival in exile, Craig (2012, based on her PhD defended in 2006) on the social ecologies of efficacy in Nepal and the Tibetan Autonomous Region (TAR) in China, Saxer (2013 [2010]) on the rapid rise of a Tibetan medicine industry in the TAR, and Blaikie (2014) on pharmacy and exchange in Ladakh. These anthropologists and their dissertations acted as exemplars and travel companions (Saxer’s book even succumbed to the Indian Monsoon), so my conclusions naturally resonate with theirs and with works of a similar calibre on Ayurveda (Banerjee 2009, Bode 2008) and Chinese medicine (Scheid 2002, Zhan 2009).

Kloos (2010, p. 336) concludes that ‘Tibetan medicine “preserves” Tibetan culture and produces a modern Tibetan nation by instantiating, materialising and validating Tibetan Buddhist ethics – and thus Tibetan culture and nation – in its medical knowledge, its institutions, doctors, pills, and efficacy’. He emphasises Sowa Rigpa’s ambivalent engagements with modernity in a transnational context, documenting its on-going and open-ended transformation into a medical system as an alternative modernity which promises to heal modern ruptures with the wholeness and ethics of tradition. Besides our

overlapping focus on Men-Tsee-Khang, in my thesis I relate most strongly to his chapter *Science and the Preservation of Tradition* (p. 274-334, developed further in Kloos 2015). The impotence of both tradition (in the face of a greedy and ‘corrupt’ market economy, as I analysed in Chapter 2) and modern science (unable to grasp by means of technology the experiential and sensorial potency of Tibetan *materia medica*) in ensuring high-quality medicine necessitates and simultaneously undermines scientific quality control, heralding a ‘silent revolution’ that redefines both science and Tibetan medicine’s identity, efficacy, ethics and knowledge. In my Chapter 4, I largely agree with this interpretation. However, I considerably shift the remit from *amchi* discourses towards the people and technologies directly involved in laboratory quality control, both in Men-Tsee-Khang and PADMA. This allowed me to uncover the multi-layered nature of the pharmaceutical quality concept and its reliance on risk assessment, which implies that it too is only measurable indirectly by approximation. I question *a priori* distinctions between ‘traditional’ and ‘modern’ practices to ensure good-quality medicine by unearthing historical connections and frictions, instead arguing for ontologically entangled enactments in both institutions. I specify an alternative to considering science as either an ornament (merely documenting the glory of Tibetan medicine) or a revolution. In-between lies a more hybrid, fluid, partial, translocal and practical engagement: a liminal phenomenon that fundamentally reconfigures boundaries between knowledge ‘systems’ and their objects. Following STS, describing and measuring quality are acts of intervention even when their effects are limited and contested.

Craig (2012) beautifully writes about the adaptive and never exclusively local nature of Sowa Rigpa, recognising the dramatic change of circumstances affecting practitioners and patients and the concomitant contradictions and compromises in the (inter)national quest for legitimacy according to institutional/government, commercial and technoscientific parameters. The evaluation of the safety, quality, efficacy and value of Tibetan medicine is increasingly linked to nationally reworked biomedical standards and associated with global markets and more hegemonic medical traditions such as Ayurveda and TCM, pressuring small-scale producers in particular. Her evocation of the biomedical R&D phrase ‘translational science’ as ‘a mode of engagement wherein venture capital, academic medicine, and Big Pharma become invested in moving innovations from “bench to market”’

(Craig 2012, p. 259) to capture the transformations just mentioned, and her expansion of the term to include the political risks, ethical ambiguities and social-ecological impacts (i.e. the ‘social ecologies’) in which these are entangled is especially conducive to my argument. Each of my chapters consists of such a dialogue, a translation exercise<sup>114</sup> aiming to bridge inadequate dichotomies and to stretch beyond disciplinary and linguistic comfort zones (cf. Craig and Glover 2009): between (ethno)botany and Sowa Rigpa (1), herbal trade policy and practice (2), industrial mass-production and artisanal manufacture (3), differing enactments of quality (4), poison (*duk*) and medicine (*men*) (5), and between textual and actual formulations (6). Especially in Chapter 5, I draw on Craig’s nuanced definition of efficacy as a multidimensional, embodied pharmaco-ritual nexus to recalibrate medicine/poison and ‘main’/‘side’ effect distinctions as the contingent result of ecological plant-practitioner-factory-patient body interactions. But as I have shown in Chapters 3 and 6, my work at PADMA has urged me to revisit sweeping notions of ‘Big Pharma’. What is ‘big’ (or high-tech) not only depends on the scale one is used to and what one compares to, it also raises the question of an unuttered opposite: Small Pharma. I recognise the horrors of the capitalist ‘casino economy’ of biomedical fact-making and the concomitant criminalisation of alternative medicine and its practitioners (Adams 2002), as well as the pharmaceuticalisation of societies by the academic-industrial-politico-legal complex (e.g. Bell et al. 2012, Petryna et al. 2006). But then again, this does not imply that the pharmaceutical industry should only consist of multinational multibillion-dollar chemical companies, nor that all its activities can be conveniently lumped together under the umbrella term ‘Global Pharma’ (as suggested by Craig and Adams 2008). Despite the similarities, overlaps and intersections, the heterodox foundations and/or aspirations of what are commonly labelled traditional, complementary and alternative medicines – even if GMP-conform mass-produced, quality-controlled and marketed – merit to be recognised for what they are: alternative pharmaceuticals. The often ‘small’ (at least relative to Big Pharma’s top ten) and alternative Pharma companies which produce these non- or borderline-biomedical products (not usually isolated chemicals, nor patented or

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<sup>114</sup> As Adams (2002) notes, the transnational circulation of and the ensuing attempts to translate between Sowa Rigpa and biomedicine ‘*create the appearance* that each is bounded, discrete, internally uniform, and different in contrast to the other’ (p. 664, original emphasis), leading to contestation between ‘knowledge systems’ without acknowledgement of their intertwinement with each other and with profit-oriented markets and regulations. It has been my aim to avoid this double flaw throughout this thesis.

prescription medicines) generally align with different ideological and political agendas and equally suffer from chemical-pharmaceutical hegemony even though technoscientific practices are appropriated and 'traditional' drugs reinvented to compete on the market. This is what Pordié and Gaudillière (2014a) call the reformulation or innovation regime in the case of Ayurvedic polyherbals, which I apply to Tibetan pharmaceuticals produced by both PADMA and Men-Tsee-Khang as I have argued. 'Smallalternative Pharma' and even herbal medicines in general are nowadays mostly pushed aside and ignored by Big Pharma, with rare but notable exceptions, as their commercial value is localised and minor even in the context of the booming Tibetan medicine industry in the TAR (Craig and Adams 2008, p. 7), which is not export-oriented and has received no significant foreign investment from transnational pharmaceutical companies thus far (Saxer 2013, p. 232). Chemical and Smallalternative Pharma are not one and the same.

This brings us to the third ethnography by Saxer (2013). In the conclusion he argues that in spite of his assumptions the industrialisation of Tibetan medicine cannot be captured by standard modernisation narratives. Instead, Saxer witnesses a 'moral economy of Tibetanness', only limited globalisation in terms of access to capital and markets outside China, and conflicts between regulations and traditional practices due to a rapid implementation rather than clashing epistemologies (see also Saxer 2012). The Sowa Rigpa industry is presented as an unpredictable, dynamic spatial-temporal assemblage marked by enduring problematisations (such as progress, culture and nation) and multiple peripheries (vis-à-vis biomedicine and TCM, and at the margins of large nation-states). I was inspired by Saxer's conception of 'border regimes' as a liminal space of unruly and malleable state power, especially as applied to the importation and trade of medicinal plants from Nepal to China (Saxer 2009). In Chapter 2, I identified similar grey zones on Indian domestic herbal markets – which operate in-between informality/illegality and formality/legality – and in Indian export to Europe. I concur with Saxer (2009, p. 327) by documenting how '[c]ross-border trade inherently makes all parties outsiders in some contexts and insiders in others', highlighting the othering role of corruption discourses and regulation-reality mismatches, and that 'the survival of a border regime rests, ironically, on both officials and traders breaking its rules in order to make it work' (ibid., p. 337). I further

explored these notions of marginality and liminality through the adoption of translocal and multispecies methodologies and by focusing on the positionality of two specific institutions, as opposed to generalising across an entire industry. My approach has the advantage that assemblages can be localised, characterised and interrogated on a micro-level and in (technoscientific) practice, allowing nonhuman agencies and materiality to be foregrounded. Furthermore, I contend that PADMA and Men-Tsee-Khang should not be lumped together with the generally much larger Chinese Sowa Rigpa companies as the former demonstrate what I tentatively term 'quasi-industrial' artisanal production characteristics (see Chapters 3 and 5 respectively).

Blaikie's (2013) admirable work opened up several productive avenues for further investigation. He was the first to relate Sowa Rigpa (in its Himalayan Indian and Ladakhi forms) to Pordié and Gaudillière's (2014a) reformulation regime by marking a number of contrasts with the Ayurvedic pharmaceutical industry (Blaikie 2015): a trend towards more complex formulations as opposed to regulation- and market-driven simplification, the confinement of issues of efficacy and quality to the individual and institutional levels, and the absence of a national pharmacopoeia and patented proprietary medicines thus far. Although there are bound to be changes as the recognition of Sowa Rigpa as an Indian System of Medicine is implemented further these differences starkly distinguish Men-Tsee-Khang from PADMA, whose practices align more readily with Ayurvedic industrial innovation regimes (see Chapter 6). On the other hand, Men-Tsee-Khang equally does not fit well with Ladakhi small-scale producers and medium-scale 'proto-industrial' cottage industries. It is also not (yet?) to be equated with the GMP-factory models espoused by Indian, Chinese and Bhutanese government institutions. In this respect both PADMA and Men-Tsee-Khang (and of course their products) are in the midst of becoming technoscientific and industrial, albeit asymmetrically. They are both operating in-between the small and the large, tradition and modernity, mainstream and alternative, and shaped by more hegemonic yet heterodox traditions and alternative medicine discourses. I expanded Blaikie's close attention to the materiality, skill and technology of Sowa Rigpa pharmacy to a European industrial setting, which is much more regimented and machine-oriented yet in a way surprisingly similar in its reliance on skilful and sensorial engagements,

relying on Ingold's ecology of materials. Furthermore, I benefitted from his discussion of the dubious role of medicinal plant cultivation and conservation, feeding into modernisation, commercialisation and industrialisation while at once supporting 'local' practitioners-producers as well as political interests of elite *amchi* (Blaikie 2009). Conservation-development discourses turned out to play a central role in state efforts to formalise the Indian herbal trade through top-down legislations and interventions, but these idealistic and simplistic controls which blame ignorant harvesters and greedy traders fail to grasp the labyrinthine and shadowy nature of a trade where informality/illegality is the necessary 'evil' of systemic malgovernance and corruption.

Finally, I hope that my thesis has shown the relevance to Sowa Rigpa of Scheid's (2002) *Chinese medicine in contemporary China*, which urges scholars from East and West to move away from essentialism and the repression of plurality; including connections with biomedicine. Similarly, I sympathise with Zhan's (2009, p. 201) move beyond 'globalisation', conceptualising difference 'as the contingent outcome rather than the starting point of translocal encounters and entanglements'. In this light, giving final answers to general questions such as 'are the pills produced by PADMA and Men-Tsee-Khang still Tibetan medicines?' and 'are they alternative/pharmaceutical/industrial?' is somewhat meaningless. Nonetheless, it is equally impossible to escape politics of identity and naming in academic practice (Hsu 2013). With the designation 'alternative pharmaceuticals', I thus consciously and contentiously position my work in-between dichotomous extremes by forging and exploring connections, flows and frictions between two seemingly unrelated manufacturers. These liminal, paradoxical yet politically subversive things oscillate betwixt and between tradition and modernity, orthodoxy and innovation, East and West. Men-Tsee-Khang and PADMA could be interpreted as two possible instantiations of a *quasi*-industrial techno-Sowa Rigpa, but only if one distinguishes 'Big' from 'Small Alternative' Pharma, and never without leaving crucial contradictions behind.

# Glossary

Simplified Tibetan Phonemic Transcription (Tibetan & Himalayan Library)	Simplified Wylie (1959) transliteration	English translation
<i>amchi</i> <i>arura</i> <i>bardo</i>	<i>am chi</i> <i>a ru ra</i> <i>bar do</i>	practitioner of Sowa Rigpa <i>Terminalia chebula</i> Retz.* intermediate period between death and rebirth; moment of suspension of ordinary consciousness
<i>béken</i> <i>bong(nga) kar(po)</i>	<i>bad kan</i> <i>bong (nga) dkar</i> <i>(po)</i>	one of the <i>nyépa sum</i> , often translated as 'phlegm' <i>Aconitum heterophyllum</i> Wall. ex Royle
<i>bong(nga) nak(po)</i> <i>chakché</i> <i>chaktsi</i> <i>changduk</i> <i>chétsa</i> <i>chuser</i>	<i>bong (nga) nag (po)</i> <i>lcags phye</i> <i>lcags rtsi</i> <i>spyang dug</i> <i>lce tsha</i> <i>chu ser</i>	<i>Aconitum</i> sp.* iron powder iron essence <i>Aconitum lycoctonum</i> L. <i>Ranunculus</i> sp.* 'yellow fluid'; variously translated as 'lymph' or 'serum'
<i>del</i>	<i>rdal</i>	personal connections, network of exchange
<i>dodrek mar</i>	<i>rdo dreg dmar</i> <i>bras bu gsum</i>	a red type of lichen (decoction of) 'the 'three fruits' ( <i>arura</i> , <i>barura</i> , <i>kyurura</i> ), marketed by PADMA as HEPATEN
<i>drébu-sum(thang)</i>	<i>(thang)</i>	
<i>Düdtsi Bumzang</i>	<i>Bdud rtsi'i bum</i> <i>bzang</i>	<i>Excellent vase of elixirs</i> ; famous early 20th-century formulary by Khyenrab Norbu
<i>duk</i> <i>dukdön</i>	<i>dug</i> <i>dug don</i>	poison, toxin the removal of toxic or coarse aspects from medicinal raw materials; fifth of the <i>Seven essential limbs</i>
<i>duk sum</i>	<i>dug gsum</i>	the 'three mental poisons' that manifest from ignorance in Buddhism
<i>gabur</i> <i>gabur-nyernga</i>	<i>ga bur</i> <i>ga bur nyer lnga</i>	camphor <i>Gabur-25</i> , 'Camphor-25'; Tibetan medical formula on which PADMA 28 is based

<i>gada</i>	<i>ga bra</i>	<i>Rubus ellipticus</i> Sm.*
<i>gozang</i>	<i>sgo bzang</i>	superior variety (often larger)
<i>gongen</i>	<i>sgo sngan</i>	inferior variety (often smaller)
<i>gulnak</i>	<i>gul nag</i>	black 'gugul', <i>Commiphora wightii</i> (Arn.) Bhandari
<i>gurgum</i>	<i>gur gum</i>	<i>Carthamus tinctorius</i> L.*
<i>Gyüzhi</i>	<i>Rgyud bzhi</i>	<i>The Four Tantras</i> ; the core text of Sowa Rigpa
<i>honglen</i>	<i>hong len</i>	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y.Hong
<i>jam tselwa</i>	<i>'jam btsal ba</i>	to make smooth, to make more digestible
<i>Jangluk</i>	<i>byang lugs</i>	the Northern school of Tibetan medicine
<i>jarkang</i>	<i>bya rkang</i>	<i>Delphinium</i> sp.*
<i>jumar</i>	<i>byu dmar</i>	red coral
<i>jungwa nga</i>	<i>'byung ba Inga</i>	the five elements (earth, water, fire, wind and space)
<i>khenda</i>	<i>mkhan da</i>	solid extract
<i>khyung-nga</i>	<i>khyung Inga</i>	Garuda-5, a very popular Tibetan medicine in the form of tiny black pills
<i>Künphen Düdtsi</i>	<i>kun phan bdud rtsi</i>	<i>Amrita extract beneficial to all</i> , most important Buryat formulary, authored by Lobsang Sherab (18th century)
<i>kyerpa karmo</i>	<i>skyer pa dkar po</i>	<i>Berberis lycium</i> Royle*
<i>latsi</i>	<i>gla rtsi</i>	musk
<i>lung</i>	<i>rlung</i>	wind (referring to the element, and the humour)
<i>lu</i>	<i>klu</i>	serpent-like spirit, <i>naga</i>
<i>mengak</i>	<i>man ngag</i>	oral instruction or teaching
<i>Mengak Lhenthap</i>	<i>man ngag lhan thabs</i>	<i>Oral Instructions for Practical Applications</i> , important 17th-century synthesis of the <i>Third Tantra</i> by Sangyé Gyatso
<i>manu</i>	<i>ma nu</i>	<i>Inula racemosa</i> Hook.f.*
<i>men</i>	<i>sman</i>	medicine; <i>materia medica</i>
<i>menchen</i>	<i>sman chen</i>	'great medicine', synonym of <i>bongnak</i> *
<i>mendep</i>	<i>sman dep</i>	medicine prescription booklet
<i>menjor</i>	<i>sman sbyor</i>	the compounding of medicine; pharmacy (discipline)
<i>menkyi gyelpo</i>	<i>sman gyi rgyal po</i>	'the king of medicine', usually <i>arura</i>
<i>menkyi öpo mépa</i>	<i>sman ky'i 'os po med pa</i>	unsuitable medicine
<i>menkhang</i>	<i>sman khang</i>	'medicine house', 'Tibetan medical institute'



<i>menrampa</i>	<i>sman rams pa</i>	title for highest degree awarded to doctors at Men-Tsee-Khang
<i>mentsikhang</i>	<i>sman rtsis khang</i>	Tibetan medical and astrological institute; 'Men-Tsee-Khang' is the Anglicised spelling used by the institute re-established in Dharamsala in exile
<i>menwa dratsang</i>	<i>sman ba grwa tshang</i>	Tibetan medical faculty (of a monastery)
<i>médrö</i>	<i>me drod</i>	digestive fire
<i>métok</i>	<i>me tog</i>	flower, flowers (category)
<i>mukchung denyön</i>	<i>smug chung 'den yon</i>	<i>Meconopsis</i> sp.
<i>mumen</i>	<i>mu men</i>	lapis lazuli
<i>né</i>	<i>nad</i>	disease, disorder
<i>ngomen</i>	<i>sngo sman</i>	herbs medicine (category)
<i>ngowo</i>	<i>ngo bo</i>	the essence or natural quality of a specific substance
<i>ngülchu</i>	<i>dngul chu</i>	'silver water', mercury
<i>ngyené</i>	<i>ngyan nad</i>	epidemic, infectious disease
<i>nüpa (gyé)</i>	<i>nus pa (rgyad)</i>	(the eight) powers or types of potency of medicines, sometimes called primary qualities
<i>nyépa (sum)</i>	<i>nyes pa (gsum)</i>	the (three) dynamics or 'humours'
<i>pangpö</i>	<i>spang spos</i>	<i>Nardostachys jatamansi</i> (D.Don) DC.
<i>payak</i>	<i>pa yag</i>	<i>Lancea tibetica</i> Hook. f. and Thomson
<i>péma</i>	<i>pad ma</i>	lotus, <i>Nelumbo nucifera</i> L.
<i>phenü</i>	<i>phan nus</i>	efficacy
<i>phenthok</i>	<i>phan thogs</i>	benefit
<i>phenyön</i>	<i>phan yon</i>	beneficial qualities (of medicine)
<i>pho rik</i>	<i>pho rigs</i>	male type (of medical substance)
<i>raduk</i>	<i>ra dug</i>	<i>Aconitum napellus</i> L.
<i>rinchen rilbu</i>	<i>rin chen ril bu</i>	precious pill, jewel pill
<i>rilbu</i>	<i>ril bu</i>	Tibetan medical pill
<i>rilsön</i>	<i>ril son</i>	small pill starters the size of barley seeds
<i>ro</i>	<i>ro</i>	taste
<i>ruta</i>	<i>ru rta</i>	<i>Saussurea costus</i> (Falc.) Lipsch.*
<i>samphel-norbu (samnor)</i>	<i>bsam 'phel nor bu</i>	'Wish-fulfilling Jewel', a popular Tibetan pill medicine for nerve disorders
<i>sendu-ngapa</i>	<i>se 'bru nga pa</i>	<i>Sendu-5</i> , market by PADMA as DIGESTIN
<i>serdok ngapa</i>	<i>gser mdog lnga pa</i>	<i>Serdok-5</i> , a Tibetan medical formula dispensed in granular form by Men-Tsee-Khang
<i>shamo</i>	<i>sha mo</i>	mushroom, mushrooms (category)

<i>Shelgong Shelthreng</i>	<i>shel gong shel 'phreng</i>	<i>Crystal Orb / Crystal Garland</i> ; seminal 18-century Tibetan <i>materia medica</i> text by Tenzin Phuntsok
<i>shingdong</i>	<i>shing dong</i>	woody plants (category)
<i>shingmen</i>	<i>shing sman</i>	woody medicine (category)
<i>shudak</i>	<i>shu dag</i>	<i>Acorus calamus</i> L.
<i>sin</i>	<i>srin</i>	intestinal parasites, or pathogens such as bacteria and viruses
<i>sogzin-chupa</i>	<i>srog 'zin chu pa</i>	<i>Sogzin-10</i> , adaptation of 11-ingredient Tibetan formula marketed by PADMA as NERVOTONIN
<i>sowa rikpa</i>	<i>gso ba rig pa</i>	Sowa Rigpa, the 'science/knowledge of healing'; mostly known as Tibetan medicine
<i>tendrel</i>	<i>rten 'brel</i>	dependent arising (Tibetan Buddhist tenet)
<i>thang</i>	<i>thang</i>	decoction
<i>thangka</i>	<i>thang ka</i>	Buddhist scroll painting
<i>thangmen</i>	<i>thang sman</i>	medicine from the plains (category)
<i>thripa</i>	<i>mkhris pa</i>	one of the <i>nyépa sum</i> , often translated as 'bile'
<i>thrishing</i>	<i>'khri shing</i>	woody vines (category)
<i>thukpa</i>	<i>thug pa</i>	Tibetan noodle soup
<i>thursel lung</i>	<i>thur sel rlung</i>	downward-clearing wind
<i>trungpé</i>	<i>'khrung dpe</i>	Tibetan medical genre or text on simples
<i>tsa</i>	<i>rtswa</i>	grass, grasses/herbs (category)
<i>tsapmen</i>	<i>tshabs sman</i>	substitution of medicine
<i>tsenduk</i>	<i>btsan dug</i>	'violent spirit poison', synonym for <i>bongnak</i> *
<i>(ajak) tserngön</i>	<i>(a byag) tsher sngon</i>	<i>Meconopsis</i> spp.*
<i>tsimen</i>	<i>rtsi sman</i>	exudent/essence medicine (category)
<i>tsotel</i>	<i>btso thal</i>	'cooked ash', detoxified mercury sulphide
<i>utpel ngönpo</i>	<i>u tpal sngon po</i>	<i>Meconopsis grandis</i> Prain
<i>utpel serpo</i>	<i>u tpal ser po</i>	<i>Meconopsis paniculata</i> Prain
<i>Vaidur Ngönpo</i>	<i>vai dhur sngon po</i>	<i>Blue beryl</i> ; important 17-century edited version of the <i>Four Tantras</i> by Sangyā Gyamtso
<i>wang (po) lak(pa)</i>	<i>dbang (po) lag (pa)</i>	<i>Dactylorhiza hatagirea</i> (D.Don) Soó
<i>yimong karmo</i>	<i>dbyi mong dkar po</i>	<i>Clematis</i> sp.* (white type)
<i>yartsa gūnbu</i>	<i>dbyar rtswa dgun 'bu</i>	<i>Ophiocordyceps sinensis</i> , caterpillar fungus

<i>yenlak dün</i>	<i>yan lag bdun</i>	<i>Seven Essential Limbs, Gyüzhi</i> section on the harvest and processing of (herbal) medicines (the seventeen) attributes or secondary qualities of medicines <i>Urtica</i> spp. The Southern school of Tibetan medicine
<i>yönten (chudün)</i>	<i>yon tan (bcu bdun)</i>	
<i>zashing</i>	<i>zwa shing</i>	
<i>Zurluk</i>	<i>zur lugs</i>	

# Bibliography

- Abraham, J. (2007). Building on sociological understandings of the pharmaceutical industry or reinventing the wheel? Response to Joan Busfield's 'Pills, power, people'. *Sociology*, 41(4), 727-736.
- Abraham, J. (2010). Pharmaceuticalization of society in context: Theoretical, empirical and health dimensions. *Sociology*, 44(4), 603-622.
- Abraham, J., and Lewis, G. (2003). Europeanization of medicines regulation. In J. Abraham and H. Lawton Smith (Eds.), *Regulation of the pharmaceutical industry* (pp. 42-81). Basingstoke and New York: Palgrave Macmillan.
- Adams, V. (1992). The production of self and body in Sherpa-Tibetan society. In M. Nichter (Ed.), *Anthropological approaches to the study of ethnomedicine* (pp. 149-189). Amsterdam: Gordon and Breach Science Publishers.
- Adams, V. (2001). Particularizing modernity: Tibetan medical theorizing of women's health in Lhasa, Tibet. In L. H. Connor and G. Samuel (Eds.), *Healing powers and modernity. Traditional medicine, shamanism and science in Asian societies* (pp. 222-246). Westport, CT: Bergin & Harvey.
- Adams, V. (2002). Randomized controlled crime. *Social Studies of Science*, 32(5-6), 659-690.
- Adams, V., Li, F. (2008) Integration or erasure? Modernizing medicine at Lhasa's Mentsikhang. In Pordié, L. (Ed.), *Tibetan medicine in the contemporary world. Global politics of medical knowledge and practice* (pp. 105-131). London and New York: Routledge.
- Adams, V., Miller, S., Craig, S., Nyima, Sonam, Droyoung, . . . Varner, M. (2005). The challenge of cross-cultural clinical trials research: case report from the Tibetan Autonomous Region, People's Republic of China. *Medical Anthropology Quarterly*, 19(3), 267-289.
- Adams, V., Schrempf, M., and Craig, S. R. (Eds.). (2011a). *Medicine between science and religion. Explorations on Tibetan grounds*. Oxford: Berghahn Books.
- Adams, V., Schrempf, M., and Craig, S. R. (2011b). Introduction: Medicine in translation between science and religion. In V. Adams, M. Schrempf, and S. R. Craig (Eds.), *Medicine between science and religion. Explorations on Tibetan grounds* (pp. 1-31). New York and Oxford: Berghahn Books.
- Aftalion, F. (1991). *A history of the international chemical industry*. Philadelphia: University of Pennsylvania Press.
- Akasoy, A., and Yoeli-Tlalim, R. (2007). Along the musk routes: Exchanges between Tibet and the Islamic world. *Asian Medicine*, 3(2), 217-240.
- Akerele, O., Heywood, V., and Synge, H. (Eds.). (1991). *Conservation of medicinal plants*. Cambridge: Cambridge University Press.
- Alexiades, M. N. (2009). The cultural and economic globalisation of traditional environmental knowledge systems. In S. Heckler (Ed.), *Landscape, process and power. Re-evaluating traditional environmental knowledge* (pp. 68-98). New York and Oxford: Berghahn Books.

- Alexiades, M. N. (Ed.) (1996). *Selected guidelines for ethnobotanical research: A field manual*. New York: The New York Botanical Garden.
- Alexiades, M. N., and Peluso, D. M. (2002). Prior informed consent: The anthropology and politics of cross-cultural exchange. In S. A. Laird (Ed.), *Biodiversity and traditional knowledge. Equitable partnerships in practice* (pp. 221-227). London: Earthscan.
- Alexiades, M. N., and Shanley, P. (2005). *Forest products, livelihoods and conservation: Case studies of non-timber forest product systems*. Bogor: CIFOR.
- Alter, J. S. (Ed.) (2005). *Asian medicine and globalization*. Philadelphia: University of Pennsylvania Press.
- Anderson, S. (2010). Pharmacy and empire: The "British Pharmacopoeia" as an instrument of imperialism 1864 to 1932. *Pharmacy in History*, 52(3/4), 112-121.
- Anderson, S. (Ed.) (2005). *Making medicines. A brief history of pharmacy and pharmaceuticals*. London: Pharmaceutical Press.
- Anderson, W. (2002). Introduction: postcolonial technoscience. *Social Studies of Science*, 32(5/6), 643-658.
- Anderson, W., and Adams, V. (2008). Pramoedya's chickens: Postcolonial studies of technoscience. In E. J. Hackett, O. Amsterdamska, M. Lynch, and J. Wajcman (Eds.), *The handbook of science and technology studies* (pp. 181-204). Cambridge, Massachusetts and London: MIT Press.
- Andrews, E. B., and Moore, N. (Eds.). (2014). *Mann's pharmacovigilance*. Chichester: Wiley Blackwell.
- Anjaria, J. S. (2011). Ordinary states: Everyday corruption and the politics of space in Mumbai. *American Ethnologist*, 38(1), 58-72.
- Anonymous. *Indian medicinal plants. A compendium of 500 species. 5 volumes*. (1994-1996). Chennai: Orient Longman.
- Anonymous. (2011). *Report of the subgroup II on NTFP sustainable management in the 12th Five year plan*. New Delhi: Planning Commission, Government of India.
- Appadurai, A. (Ed.) (1986). *The social life of things. Commodities in cultural perspective*. Cambridge: Cambridge University Press.
- Arbuzov, A. (2010). Substitutions in traditional Tibetan medicine. *TTM Journal*, 1(3), 14-18.
- ASA (Association of Social Anthropologists of the UK and Commonwealth). (2011). *Ethical guidelines for good research practice*. Retrieved from <http://www.theasa.org/ethics/guidelines.shtml> on 14 June 2016.
- Aschoff, J. C. (1996). *Annotated bibliography of Tibetan medicine (1789-1995). Kommentierte Bibliographie zur tibetischen Medizin (1789-1995)*. Ulm and Dietikon: Fabri Verlag and Garuda Verlag.
- Aschoff, J. C., and Tashigang, T. Y. (2004). *Tibetan jewel pills. The rinchen medicine*. Ulm and Donau: Fabri Verlag.
- Aschoff, J. C., Tashigang, T. Y., and Maier, J. (1997). Clinical trial in migraine prophylaxis with a multicomponent Tibetan jewel-pill: transfer problems of Tibetan into Western medicine, demonstrated "pars pro toto" on the Aconite plants in our Tibetan prescription. In J. C. Aschoff and I. Rösing (Eds.), *Tibetan medicine: "East meets West, West meets East". Proceedings of the International Symposium (University of Ulm, Germany, 19-20 July 1996)* (pp. 21-38). Ulm: Fabri Verlag.
- Ashforth, A. (2005). Muthi, medicine and witchcraft: Regulating 'African science' in post-Apartheid South Africa? *Social Dynamics*, 31(2), 211-242.
- Aspers, P. (2015). Performing ontology. *Social Studies of Science*, 45(3), 449-453.

- Aumeeruddy-Thomas, Y., and Lama, Y. C. (2008). Tibetan medicine and biodiversity management in Dolpo, Nepal: negotiating local and global worldviews, knowledge and practices. In L. Pordié (Ed.), *Tibetan medicine in the contemporary world. Global politics of medical knowledge and practice* (pp. 28). London and New York: Routledge.
- Aumeeruddy-Thomas, Y., and Pei, S. (2003). Applied ethnobotany: case-studies from the Himalayan region. *People and Plants working paper*, 12.
- Badmajew, P., Jr., Badmajew, V., Jr., and Park, L. (1982). *Healing herbs: The heart of Tibetan medicine*. Berkeley, CA: Ret Lotus Press.
- Banerjee, M. (2009). *Power, knowledge, medicine: Ayurvedic pharmaceuticals at home and in the world*. Hyderabad: Orient Blackswan.
- Bates, D. (Ed.) (1995). *Knowledge and the scholarly medical traditions*. New York: Cambridge University Press.
- Beck, U. (1992, original in German in 1986). *Risk society: Towards a new modernity*. London: Sage.
- Beentje, H. (2010). *The Kew plant glossary: An illustrated dictionary of plant terms*. Richmond: The Board of Trustees of the Royal Botanic Gardens, Kew.
- Beer, R. (2003). *The handbook of Tibetan Buddhist symbols*. Chicago and London: Serindia.
- Beigh, S. Y., Nawchoo, I. A., and Iqbal, M. (2005). Cultivation and conservation of *Aconitum heterophyllum*: A critically endangered medicinal herb of the Northwest Himalayas. *Journal of Herbs, Spices and Medicinal Plants*, 11(4), 47-56.
- Belcher, B., and Schreckenber, K. (2007). Commercialisation of non-timber forest products: A reality check. *Development Policy Review*, 25(3), 355-377.
- Bell, K. (2014). Resisting commensurability: Against informed consent as an anthropological virtue. *American Anthropologist*, 116(3), 511-522.
- Bell, S. E., and Figert, A. E. (2012). Medicalization and pharmaceuticalization at the intersections: Looking backward, sideways and forward. *Social Science and Medicine*, 75(5), 775-783.
- Bennett, J. (2010). *Vibrant matter. A political ecology of things*. Durham and London: Duke University Press.
- Bensky, D., Clavey, S., and Stöger, E. (2004). Introduction. *Chinese herbal medicine: Materia medica* (pp. xiii-xxxi). Seattle: Eastland Press.
- Berlin, B. (1992). *Ethnobiological classification. Principles of categorization of plants and animals in traditional societies*. Princeton, NJ: Princeton University Press.
- Berlin, B., Breedlove, D. E., and Raven, P. H. (1973). General principles of classification and nomenclature in folk biology. *American Anthropologist*, 75(1), 214-242.
- Berliner, D., Legrain, L., and van de Port, M. (2013). Bruno Latour and the anthropology of the moderns. *Social Anthropology*, 21(4), 435-447.
- Bernard, H. R. (2011). *Research methods in anthropology: Qualitative and quantitative approaches*. Lanham: AltaMira Press.
- Besch, N. F. (2006). *Tibetan medicine off the roads: Modernizing the work of the amchi in Spiti*. Doctoral dissertation. Ruprecht-Karls-Universität, Heidelberg.
- Bessire, L., and Bond, D. (2014). Ontological anthropology and the deferral of critique. *American Ethnologist*, 41(3), 440-456.
- Bivins, R. (2007). *Alternative medicine? A History*. New York: Oxford University Press.
- Bivins, R. (2015). Limits and liberties: CAM, regulation and the medical consumer in historical perspective. In N. K. Gale and J. V. McHale (Eds.), *Routledge handbook of*

- complementary and alternative medicine: Perspectives from social science and law* (pp. 13-29). London and New York: Routledge.
- Blaikie, C. (2009). Critically endangered? Medicinal plant cultivation and the reconfiguration of Sowa Rigpa in Ladakh. *Asian Medicine*, 5(2), 243-272.
- Blaikie, C. (2013). Currents of tradition in Sowa Rigpa pharmacy. *East Asian Science, Technology and Society*, 7(3), 425-451.
- Blaikie, C. (2014). *Making medicine: Pharmacy, exchange and the production of Sowa Rigpa in Ladakh*. Doctoral dissertation. University of Kent, Canterbury.
- Blaikie, C. (2015). Wish-fulfilling jewel pills: Tibetan medicines from exclusivity to ubiquity. *Anthropology and Medicine*, 1-16.
- Blaikie, C., Craig, S., Gerke, B., and Hofer, T. (2015). Co-producing efficacious medicines: Collaborative event ethnography with Himalayan and Tibetan Sowa Rigpa practitioners. *Current Anthropology*, 56(2), 178-204.
- Blezer, H., Czaja, O., Garrett, F., Manevskaia, I., McKay, A., and Schrempf, M. (2007). Brief outlook: Desiderata in the study of the history of Tibetan medicine. In M. Schrempf (Ed.), *Soundings in Tibetan medicine. Anthropological and historical perspectives* (pp. 427-438). Leiden: Brill.
- Bode, M. (2008). *Taking traditional knowledge to the market: The modern image of the Ayurvedic and Unani industry 1980-2000*. Hyderabad: Orient Blackswan.
- Boesi, A. (2004). *Le savoir botanique des Tibétains: Perception, classification et exploitation des plantes sauvages*. Doctoral dissertation. Université de la Méditerranée, Marseille.
- Boesi, A. (2005). Plant knowledge among Tibetan populations. In A. Boesi and F. Cardi (Eds.), *Wildlife and plants in traditional and modern Tibet: conceptions, exploitation, and conservation* (Vol. 33, pp. 33-48): Memorie della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano.
- Boesi, A. (2005-2006). Plant categories and types in Tibetan *materia medica*. *The Tibet Journal*, XXX and XXXI(4 and 1), 65-90.
- Boesi, A. (2007). The nature of Tibetan plant nomenclature. *The Tibet Journal*, XXXII(1), 3-28.
- Boesi, A., and Cardi, F. (2006). Tibetan herbal medicine: Traditional classification and utilization of natural products in Tibetan Materia Medica. *HerbalGram*, 71, 38-48.
- Bolsokhoyeva, N. (1999). Medical faculties of Buryat Buddhist monasteries. *AyurVijnana*, 6(1), 3-9.
- Bolsokhoyeva, N. (2007). Tibetan medical schools of the Aga area (Chita region). *Asian Medicine*, 3(2), 334-346.
- Bonneuil, C. (2002). The manufacture of species: Kew Gardens, the empire and the standardisation of taxonomic practices in late 19th century botany. In M.-N. Bourguet, C. Licoppe, and O. Sibum (Eds.), *Instruments, travel and science. Itineraries of precision from the 17th to the 20th century* (pp. 189-215). London and New York: Routledge.
- Bouin, A.-S., and Wierer, M. (2014). Quality standards of the European Pharmacopoeia. *Journal of Ethnopharmacology*, 158, Part B, 454-457.
- Bowker, G. C., and Star, S. L. (1999). *Sorting things out: classification and its consequences*. Cambridge, Mass.: MIT Press.
- Braverman, H. (1974). *Labor and monopoly capital*. New York: Monthly Review Press.

- Brockway, L. H. (1979). Science and colonial expansion: The role of the British Royal Botanic Gardens. *American Ethnologist*, 6(3), 449-465.
- Brotherton, P. S., and Nguyen, V.-K. (2013). Revisiting local biology in the era of Global Health. *Medical Anthropology*, 32(4), 287-290.
- Bubandt, N. (2006). Sorcery, corruption, and the dangers of democracy in Indonesia. *Journal of the Royal Anthropological Institute*, 12(2), 413-431.
- Bundesamt für Kultur, Schweizerischen Eidgenossenschaft. (2012). *Naturheilkunde in Appenzell Ausserrhoden (Lebendige Traditionen)*. Bundesamt für Kultur, Bern. Retrieved from <http://www.lebendige-traditionen.ch/traditionen/00182/index.html?lang=de> on 7 December 2015.
- Bundesversammlung der Schweizerischen Eidgenossenschaft. (2002). 812.21 Bundesgesetz vom 15. Dezember 2000 über Arzneimittel und Medizinprodukte (Heilmittelgesetz, HMG). Bundesrat, Bern. Retrieved from <https://www.admin.ch/opc/de/classified-compilation/20002716/index.html> on 8 December 2015.
- Busfield, J. (2006). Pills, power, people: Sociological understandings of the pharmaceutical industry. *Sociology*, 40(2), 297-314.
- Byg, A., Salick, J., and Law, W. (2010). Medicinal plant knowledge among lay people in five Eastern Tibet villages. *Human Ecology*, 38(2), 177-191.
- Calabrese, E. J., and Blain, R. (2005). The occurrence of hormetic dose responses in the toxicological literature, the hormesis database: An overview. *Toxicology and applied pharmacology*, 202(3), 289-301.
- Cardi, F. (2004). *De l'approvisionnement des substances médicinales à la fabrication des médicaments: L'évolution contemporaine de la pharmacopée tibétaine*. Doctoral dissertation. Université de la Méditerranée, Marseille.
- Cardi, F. (2005-2006). Principles and methods of assembling Tibetan medicaments. *The Tibet Journal*, XXX and XXXI(4 and 1), 91-108.
- Casagrande, D. G. (2004). Ethnobiology lives! Theory, collaboration, and possibilities for the study of folk biologies. *Reviews in Anthropology*, 33(4), 351-370.
- Chan, T. Y. (2011). Causes and prevention of herb-induced aconite poisonings in Asia. *Human and Experimental Toxicology*, 30(12), 2023-2026.
- Chan, T. Y. K. (2009). Aconite poisoning. *Clinical Toxicology*, 47(4), 279-285.
- Chaudhuri, S. (2012). Women as easy scapegoats: Witchcraft accusations and women as targets in tea plantations of India. *Violence Against Women*, 18(10), 1213-1234.
- Choy, T. K., Faier, L., Hathaway, M. J., Inoue, M., Satsuka, S., and Tsing, A. (2009). A new form of collaboration in cultural anthropology: Matsutake worlds. *American Ethnologist*, 36(2), 380-403.
- Clark, B. (1995). *The quintessence tantras of Tibetan medicine*. New York: Snow Lion Publications.
- Clark, B. (2000). Problems in identifying and translating *materia medica* used in Tibetan medicine. *AyurVijnana*, 7, 55-57.
- Clarke, A. E., Shim, J. K., Mamo, L., Fosket, J. R., and Fishman, J. R. (2003). Biomedicalization: Technoscientific transformations of health, illness, and U.S. biomedicine. *American Sociological Review*, 68(2), 161-194.
- Coleman, S., and von Hellermann, P. (Eds.). (2011). *Multi-sited ethnography. Problems and possibilities in the translocation of research methods*. New York and London: Routledge.



- Collins, H. (1974). The TEA set: Tacit knowledge and scientific networks. *Science Studies*, 4(2), 165-186.
- Compagnoni, S. C., Kupferschmidt, H., Scharf, C., and Glisenti, P. (2013). Die blaue Blume im Pilzsalat. *Notfall + Rettungsmedizin*, 16(4), 280-283.
- Conklin, H. C. (1962). Lexicographical treatment of folk taxonomies. *International Journal of American Linguistics*, 28, 119-141.
- Cooney, R. (2004). *The precautionary principle in biodiversity conservation and natural resource management: An issues paper for policy-makers, researchers and practitioners*. Gland and Cambridge: IUCN.
- Cooper, K., Noller, B., Connell, D., Yu, J., Sadler, R., Olszowy, H., . . . Myers, S. (2007). Public health risks from heavy metals and metalloids present in traditional Chinese medicines. *Journal of Toxicology and Environmental Health, Part A*, 70(19), 1694-1699.
- Craig, S., and Adams, V. (2008). Global Pharma in the Land of Snows: Tibetan medicines, SARS, and identity politics across nations. *Asian Medicine*, 4(1), 1-28.
- Craig, S. R. (2011). "Good" manufacturing by whose standards? Remaking concepts of quality, safety, and value in the production of Tibetan medicines. *Anthropological Quarterly*, 84(2), 331-378.
- Craig, S. R. (2012). *Healing elements: efficacy and the social ecologies of Tibetan medicine*. Berkeley: University of California Press.
- Craig, S. R., and Glover, D. M. (2009). Conservation, cultivation, and commodification of medicinal plants in the Greater Himalayan-Tibetan Plateau. *Asian Medicine*, 5(2), 219-242.
- Cranz, H., and Anquez-Traxler, C. (2014). TradReg 2013: Regulation of herbal and traditional medicinal products – European and global strategies – International symposium. *Journal of Ethnopharmacology*, 158, Part B(0), 495-497.
- Cuomu, M. (2013). Qualitative exploration of the potential causes of serious reduction in availability of medicinal plants in the Qinghai-Tibetan High Plateau. *East Asian Science, Technology and Society*, 7(3), 397-423.
- Czaja, O. (2005-2006). Zurkharwa Lodro Gyalpo (1509-1579) on the controversy of the Indian origin of the *rGyud bzhi*. *The Tibet Journal*, XXX and XXXI(4 and 1), 131-152.
- Czaja, O. (2013). Tibetan medicinal plants and their healing potentials. In F.-K. Ehrhard and P. Maurer (Eds.), *Nepalica-Tibetica: Festgabe for Christoph Cüppers* (Vol. 1, pp. 89-117). Andiast: International Institute for Tibetan and Buddhist Studies.
- Das, A., and Jeffery, R. (2009). Pharmaceuticals, physicians and public policy: unravelling the relationships. *Journal of Health Studies*, 2(1,2,3), 6-12.
- Dash, B. (1976). *Tibetan medicine, with special reference to Yoga Sataka*. Dharamsala: Library of Tibetan Works and Archives.
- Dash, B. (1994). *Pharmacopoeia of Tibetan medicine*. Delhi: Sri Satguru Publications.
- Dash, V. B. (1994). *Materia medica of Tibetan medicine*. New Delhi: Indian Books Centre and Sri Satguru.
- Dashiyev, D. D. (1999). Experiences with comparative studies of Tibetan medical formulae. *AyurVijnana*, 6(1), 10-15.
- Dave, N. N. (2014). WITNESS: Humans, animals, and the politics of becoming. *Cultural Anthropology*, 29(3), 433-456.
- David, B., Wolfender, J.-L., and Dias, D. A. (2015). The pharmaceutical industry and natural products: historical status and new trends. *Phytochemistry Reviews*, 14(2), 299-315.

- Davies, C. A. (2008). Reflexivity and ethnographic research. In *Reflexive ethnography. A guide to researching selves and others* (pp. 3-27). London and New York: Routledge.
- Davis, C., and Abraham, J. (2013). *Unhealthy pharmaceutical regulation: Innovation, politics and promissory Science*. Basingstoke and New York: Palgrave MacMillan.
- Dawa. (1998, translated into English in 1999). *Comparisons between Padma-28 and Gabur-25*. Dharamsala: Men-Tsee-Khang. Internal document at PADMA's library, Wetzikon.
- Dawa. (1999). *A clear mirror of Tibetan medicinal plants: Volume I*. Rome: Tibet Domani.
- Dawa. (2009). *A clear mirror of Tibetan medicinal plants. Second volume*. Dharamsala: Men-Tsee-Khang.
- De Cleene, M., and Lejeune, M. C. (2003). *Compendium of symbolic and ritual plants in Europe*. Ghent: Mens and Cultuur Uitgevers.
- de la Cadena, M., Lien, M. E., Blaser, M., Jensen, C. B., Lea, T., Morita, A., . . . Wiener, M. (2015). Forum: Anthropology and STS. *HAU: Journal of Ethnographic Theory*, 5(1), 437-475.
- Dejouhanet, L. (2014a). Supply of medicinal raw materials. *Asian Medicine*, 9(1-2), 206-235.
- Dejouhanet, L. (2014b). Secteur informel et réseaux de commercialisation des plantes médicinales au Kerala (Inde). *Économie rurale*, 343, 53-70.
- Deleuze, G., and Guattari, F. (2004). *A thousand plateaus* (B. Massumi, Trans.). London and New York: Continuum.
- Desai, A. (2009). Anti-'anti-witchcraft' and the Maoist insurgency in rural Maharashtra, India. *Dialectical Anthropology*, 33(3), 423-439.
- Dinan, D. (2014). *Europe recast: A history of European union*. Boulder, CO: Lynne Rienner Publishers.
- Doing, P. (2004). 'Lab hands' and the 'Scarlet O': Epistemic politics and (scientific) Labor. *Social Studies of Science*, 34(3), 299-323.
- Doing, P. (2008). Give me a laboratory and I will raise a discipline: The past, present, and future politics of laboratory studies in STS. In E. J. Hackett, O. Amsterdamska, M. Lynch, and J. Wajcman (Eds.), *The handbook of science and technology studies* (pp. 279-296). Cambridge, MA and London: MIT Press.
- Dolma, S. (2013). Understanding ideas of toxicity in Tibetan medical processing of mercury. *Asian Medicine*, 8(1), 106-119.
- Dorje, G., and Gonkatsang, T. D. (2009). An investigation into the advisability of translating names of Tibetan medicine into other languages. *Asian Medicine*, 5(2), 394-406.
- Droney, D. (2014). Ironies of laboratory work during Ghana's second age of optimism. *Cultural Anthropology*, 29(2), 363-384.
- Drungtso, T. T., and Drungtso, T. D. (2005). *Tibetan-English dictionary of Tibetan medicine and astrology*. New Delhi: Archana Press.
- Eardley, S., Bishop, F. L., Prescott, P., Cardini, F., Brinkhaus, B., Santos-Rey, K., . . . Lewith, G. (2012). A Systematic Literature Review of Complementary and Alternative Medicine Prevalence in EU. *Complementary Medicine Research*, 19 (suppl. 2), 18-28.
- Ellen, R. (2006a). Introduction. In R. Ellen (Ed.), *Ethnobiology and the science of humankind* (pp. 1-22). Oxford: Wiley-Blackwell.
- Ellen, R. (Ed.) (2006b). *The Categorical impulse: Essays in the anthropology of classifying behaviour*. New York and Oxford: Berghahn Books.
- Ellen, R. (2016). Is there a role for ontologies in understanding plant knowledge systems? *Journal of Ethnobiology*, 36(1), 10-28.

- Ellen, R. F., and Harris, H. (2000). Introduction. In R. F. Ellen, P. Parkes, and A. Bicker (Eds.), *Indigenous knowledge and its transformations. Critical anthropological perspectives* (pp. 1-29). Amsterdam: Harwood Academic Publishers.
- Ellen, R. F., Parkes, P., and Bicker, A. (Eds.). (2000). *Indigenous knowledge and its transformations: Critical anthropological perspectives*. Amsterdam: Harwood Academic Publishers.
- EMA. (2014). User guide for micro, small and medium-sized enterprises (Doc. Ref. EMA/860940/2011). Retrieved from [http://www.ema.europa.eu/docs/en\\_GB/document\\_library/Regulatory\\_and\\_procedural\\_guideline/2009/10/WC500004134.pdf](http://www.ema.europa.eu/docs/en_GB/document_library/Regulatory_and_procedural_guideline/2009/10/WC500004134.pdf) on 23 April 2016.
- EMA/HMPC. (2007). Guideline on quality of combination herbal medicinal products / traditional herbal medicinal products (Doc. Ref. EMEA/HMPC/CHMP/CVMP/214869/2006). Retrieved from [http://www.ema.europa.eu/docs/en\\_GB/document\\_library/Scientific\\_guideline/2009/09/WC500003298.pdf](http://www.ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2009/09/WC500003298.pdf) on 21 April 2016.
- EMA/HMPC. (2013). Regulatory QandA on herbal medicinal products (Doc. Ref. EMA/HMPC/345132/2010 Rev. 2 Corr). Retrieved from [http://www.ema.europa.eu/docs/en\\_GB/document\\_library/Other/2011/03/WC500104038.pdf](http://www.ema.europa.eu/docs/en_GB/document_library/Other/2011/03/WC500104038.pdf) on 22 April 2016.
- EMA/HMPC. (2014). Questions and Answers on the EU Framework for (traditional) herbal medicinal products, including those from a 'non-European' Tradition (Doc. Ref. EMA/HMPC/402684/2013). Retrieved from [http://www.ema.europa.eu/docs/en\\_GB/document\\_library/Regulatory\\_and\\_procedural\\_guideline/2014/05/WC500166358.pdf](http://www.ema.europa.eu/docs/en_GB/document_library/Regulatory_and_procedural_guideline/2014/05/WC500166358.pdf) on 21 April 2016.
- Endersby, J. (2009). Lumpers and splitters: Darwin, Hooker, and the search for order. *Science*, 326(5959), 1496-1499.
- Epstein, A. L. (Ed.) (1979). *The craft of social anthropology*. Oxford: Pergamon Press.
- Erikson, E. (2014). *Between monopoly and free trade: The English East India Company, 1600-1757*. Princeton and Oxford: Princeton University Press.
- Ernst, E. (2008). How the public is being misled about complementary/alternative medicine. *Journal of the Royal Society of Medicine*, 101(11), 528-530.
- Ernst, E., and Singh, S. (2008). *Trick or treatment: The undeniable facts about alternative medicine*. London: W.W. Norton and Company.
- Escobar, A. (1995). *Encountering development. The making and unmaking of the Third World*. Princeton: Princeton University Press.
- Etkin, N. L. (1988). Cultural constructions of efficacy. In S. Van der Geest and S. R. Whyte (Eds.), *The context of medicines in developing countries: studies in pharmaceutical anthropology* (pp. 299-327). Dordrecht: Kluwer Academic Publishers.
- Etkin, N. L. (1992). "Side effects": Cultural constructions and reinterpretations of Western pharmaceuticals. *Medical Anthropology Quarterly*, 6(2), 99-113.
- Etkin, N. L. (2006). *Edible medicines: An ethnopharmacology of food*. Tucson: The University of Arizona Press.
- EUROCAM. (2015). *Ensuring the availability of CAM medicinal products: Building on recommendations of the Matrix Insight report, highlighting the need for additional measures*. Brussels: EUROCAM.
- European Commission. (2004). Directive 2004/24/EC of the European Parliament and of the Council of 31 March 2004 amending, as regards traditional herbal medicinal

products, Directive 2001/83/EC on the Community code relating to medicinal products for human use. Retrieved from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0024:EN:NOT> on 24 April 2016.

- Falconer, H. (1841). Aucklandia. *Annals and magazine of natural history, including zoology, botany, and geology*, 6, 456-457.
- Falzon, M.-A. (Ed.) (2009). *Multi-sited ethnography. Theory, praxis and locality in contemporary research*. Farnham: Ashgate.
- Fan, R. (2003). Modern Western science as a standard for traditional Chinese medicine: A critical appraisal. *The Journal of Law, Medicine and Ethics*, 31(2), 213-221.
- Fan, R., and Holliday, I. (2007). Which medicine? Whose standard? Critical reflections on medical integration in China. *Journal of Medical Ethics*, 33(8), 454-461.
- Farquhar, J. (1994). *Knowing practice: The clinical encounter of Chinese medicine*. Boulder: Westview Press.
- Farquhar, J., and Lock, M. (2007). Introduction. In M. Lock and J. Farquhar (Eds.), *Beyond the body proper. Reading the anthropology of material life* (pp. 1-16). Durham: Duke University Press.
- Faulkner, A. (2012). Steering biomedicine: regulatory dynamics of therapeutic technologies in the European Union and beyond. *Innovation: The European Journal of Social Science Research*, 25(4), 355-361.
- Finholt, T. A. (2002). Collaboratories. *Annual Review of Information Science and Technology*, 36(1), 73-107.
- Fischer, M. M. J. (2007). Four genealogies for a recombinant anthropology of science and technology. *Cultural Anthropology*, 22(4), 539-615.
- Flück, H., and Bubb, W. (1970). Eine lamaistische Rezeptformel zur Behandlung der chronischen Verstopfung. *Praxis*, 59, 1190-1193.
- Forsyth, T. (1998). Mountain myths revisited: integrating natural and social environmental science. *Mountain Research and Development*, 18, 107-116.
- Fremantle, F. (2001). *Luminous emptiness. Understanding the Tibetan Book of the Dead*. Boston: Shambala Publications.
- Friedman, A. L. (1977). *Industry and labour*. London: MacMillan.
- Fritzsche, B. (1996). Switzerland. In M. Tech and R. Porter (Eds.), *The Industrial Revolution in national context: Europe and the USA* (pp. 126-148). Cambridge: Cambridge University Press.
- Ga, Y. (2010). *The sources for the writing of the Rgyud bzhi, Tibetan medical classic*. Doctoral dissertation. Harvard University, Cambridge, MA.
- Gabe, J., Williams, S., Martin, P., and Coveney, C. (2015). Pharmaceuticals and society: Power, promises and prospects. *Social Science and Medicine*, 131, 193-198.
- Gachon, F., and Firsov, D. (2011). The role of circadian timing system on drug metabolism and detoxification. *Expert Opinion on Drug Metabolism and Toxicology*, 7(2), 147-158.
- Gale, N. (2014). The sociology of traditional, complementary and alternative Medicine. *Sociology Compass*, 8(6), 805-822.
- Gale, N. K., and McHale, J. V. (Eds.). (2015). *Routledge handbook of complementary and alternative medicine: Perspectives from social science and law*. London and New York: Routledge.

- Gammerman, A. F., and Semichov, B. V. (1963). *Slovar' tibetsko-latino-russkikh nazvanii lekarsven-nogo rastitel'nogo syr'a, preminiaemogo V Tibetskoj medizine [Tibetan-Latin-Russian dictionary of the names of medicinal raw materials, used in Tibetan medicine]*. Ulan-Ude: Publishing House of the Buryat Complex Scientific Research Institute, Siberian Division of the USSR Academy of Sciences.
- Ganguly, R. (2012). *Staging 'Open-minded science': Culture and evidence in contemporary Ayurvedic laboratory research in India*. Doctoral dissertation. University of Minnesota, Twin Cities.
- Ganguly, R. (2014). Sense and evidence: Ayurvedic experiments and the politics of an 'Open-minded' science. *Asian Medicine*, 9(1-2), 102-140.
- Garrett, F. (2007). Critical methods in Tibetan medical histories. *The Journal of Asian Studies*, 66(2), 363-387.
- Garrett, F. (2008). *Religion, medicine and the human embryo in Tibet*. London and New York: Routledge.
- Gaudillière, J.-P. (2013). Professional and industrial drug regulation in France and Germany: The trajectories of plant extracts. In J.-P. Gaudillière and V. Hess (Eds.), *Ways of regulating drugs in the 19th and 20th centuries* (pp. 17-42). Basingstoke: Palgrave Macmillan.
- Gaudillière, J.-P. (2014). Herbalised Ayurveda? *Asian Medicine*, 9(1-2), 171-205.
- Gaudillière, J.-P., and Hess, V. (Eds.). (2013). *Ways of regulating drugs in the 19th and 20th centuries*. Palgrave Macmillan: Basingstoke.
- Gereffi, G., Humphrey, J., and Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), 78-104.
- Gereffi, G., and Lee, J. (2016). Economic and social upgrading in global value chains and industrial clusters: Why governance matters. *Journal of Business Ethics*, 133(1), 25-38.
- Gerke, B. (2012). Treating essence with essence: Re-inventing *bcud len* as vitalising dietary supplements in contemporary Tibetan medicine. *Asian Medicine*, 7, 196-224.
- Gerke, B. (2013). The social life of *tsotel*: Processing mercury in contemporary Tibetan medicine. *Asian Medicine*, 8(1), 120-152.
- Gerke, B. (2015). Moving from efficacy to safety: A changing focus in the study of Asian medical systems. *Journal of the Anthropological Society of Oxford*, VII(3), 370-384.
- Gerke, B. (2016, in press). When *ngülchu* is not mercury: Tibetan taxonomies of 'metals'. In F. M. Ferrari and T. Dähnhardt (Eds.), *Soulless matter, seats of energy: Metals, gems and minerals in South Asian religions and culture*. Sheffield: Equinox Publishing.
- Geschiere, P. (2001). Witchcraft. In N. J. Smelser and P. B. Baltes (Eds.), *International Encyclopedia of the Social and Behavioral Sciences* (pp. 16514-16517). Oxford: Elsevier.
- Gethin, R. (1998). *The foundations of Buddhism*. Oxford and New York: Oxford University Press.
- Ghimire, S. K. (2008). Sustainable harvesting and management of medicinal plants in the Nepal Himalaya: current issues, knowledge gaps and research priorities. In P. K. Jha, S. B. Karmacharya, M. K. Chhetri, C. B. Thapa, and B. B. Shrestha (Eds.), *Medicinal plants in Nepal: an anthology of contemporary research* (pp. 25-42). Kathmandu: Ecological Society.
- Ghimire, S. K., and Aumeeruddy-Thomas, Y. (2009). Ethnobotanical classification and plant nomenclature system of high altitude agro-pastoralists in Dolpo, Nepal. *Botanica Orientalis*, 6, 56-68.

- Ghimire, S. K., McKey, D., and Aumeeruddy-Thomas, Y. (2004). Heterogeneity in ethnoecological knowledge and management of medicinal plants in the Himalayas of Nepal: Implications for conservation. *Ecology and Society*, 9(3), 6.
- Gibbon, P., Bair, J., and Ponte, S. (2008). Governing global value chains: An introduction. *Economy and Society*, 37(3), 315-338.
- Gibson, J. J. (1979). *The ecological approach to visual perception*. Boston, MA: Houghton Mifflin.
- Gilbert, M. (2008). Narrating the process: Questioning the progressive story of European integration. *Journal of Common Market Studies*, 46(3), 641-662.
- Glover, D. M. (2005). *Up from the roots: contextualising medicinal plant classifications of Tibetan doctors in Rgyalthang, PRC*. Doctoral Dissertation. University of Washington, Seattle.
- Glover, D. M. (2010). Classes in the classics: historical changes in plant classification in two Tibetan medical texts. In S. Craig, M. Cuomu, F. Garrett, and M. Schrempf (Eds.), *Studies of medical pluralism in Tibetan history and society* (pp. 255-277). Andiast: International Institute for Tibetan and Buddhist Studies.
- Goldacre, B. (2013). *Bad Pharma: How medicine is broken, and how we can fix it*. London: Fourth Estate.
- Gonpo, Y. Y. (2008). *The Root Tantra and The Explanatory Tantra from the Secret Quintessential Instructions on the Eight Branches of the Ambrosia Essence Tantra* (T. Paljor, P. Wangdu, and S. Dolma, Trans.). Dharamsala: Men-Tsee-Khang Publications.
- Gonpo, Y. Y. (2011). *The Subsequent Tantra from the Secret Quintessential Instructions on the Eight Branches of the Ambrosia Essence Tantra* (T. Paljor, T. Thackchoe, J. Dolma, N. Lhamo, T. Choying, S. Dolma, P. Wangdu, Norchung, and P. Tsetso, Trans.). Dharamsala: Men-Tsee-Khang Publications.
- Good, B. J. (1994). *Medicine, rationality, and experience: An anthropological perspective*. Cambridge: Cambridge University Press.
- Grass, M., and Mösle, S. (2015). *The importance of the pharmaceutical industry for Switzerland*. Interpharma, Basel.
- Griffin, J. P. (2004). Venetian treacle and the foundation of medicines regulation. *British Journal of Clinical Pharmacology*, 58(3), 317-325.
- Gupta, A. (1995). blurred boundaries: The discourse of corruption, the culture of politics, and the imagined state. *American Ethnologist*, 22(2), 375-402.
- Gupta, A. (2005). Narratives of corruption: Anthropological and fictional accounts of the Indian state. *Ethnography*, 6(1), 5-34.
- Gupta, A. (2012). *Red tape: Bureaucracy, structural violence, and poverty in India*. Durham and London: Duke University Press.
- Gupta, A., and Ferguson, J. (1992). Beyond "culture": space, identity, and the politics of difference. *Cultural Anthropology*, 7(1), 6-23.
- Gyatso, D. S. (2010). *Mirror of Beryl. A historical introduction to Tibetan medicine* (G. Kilty, Trans.). Boston: Wisdom Publications.
- Gyatso, J. (2015). *Being human in a Buddhist world: An intellectual history of medicine in early modern Tibet*. New York: Columbia University Press.
- Gyatso, T., and Hakim, C. (2010). *Essentials of Tibetan traditional medicine*. Berkeley, CA: North Atlantic Books.

- Haller, D., and Shore, C. (Eds.). (2005). *Corruption: Anthropological perspectives*. London: Pluto Press.
- Hamilton, A. C. (2004). Medicinal plants, conservation and livelihoods. *Biodiversity and Conservation*, 13(8), 1477-1517.
- Hanegraaff, W. J. (2003). How magic survived the disenchantment of the world. *Religion*, 33(4), 357-380.
- Hannerz, U. (2003). Being there... and there... and there!: Reflections on multi-site ethnography. *Ethnography*, 4(2), 201-216.
- Haraway, D. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies*, 14(3), 575-599.
- Haraway, D. (1991). *Simians, cyborgs, and women: the reinvention of nature*. New York: Routledge.
- Harris, P. E., Cooper, K. L., Relton, C., & Thomas, K. J. (2012). Prevalence of complementary and alternative medicine (CAM) use by the general population: a systematic review and update. *International Journal of Clinical Practice*, 66(10), 924-939.
- Hayles, K. (1999). *How we became posthuman. Virtual bodies in cybernetics, literature, and informatics*. Chicago: University of Chicago Press.
- He, J. (2010). Globalised forest-products: Commodification of the matsutake mushroom in Tibetan villages, Yunnan, Southwest China. *International Forestry Review*, 12(1), 27-37.
- Heywood, P. M. (Ed.) (2015). *Routledge handbook of political corruption*. Abingdon: Routledge.
- Hofer, T. (2014a). Illustrated *materia medica* prints, manuscripts, and modern books. In T. Hofer (Ed.), *Bodies in balance. The art of Tibetan medicine* (pp. 226-245). New York and Seattle: Rubin Museum of Art and University of Washington Press.
- Hofer, T. (Ed.) (2014b). *Bodies in balance: The art of Tibetan medicine*. New York: Rubin Museum of Art and University of Washington Press.
- Holley, J., and Cherla, K. (1998). *The medicinal plants sector in India*. International Development Research Centre and Medicinal and Aromatic Plants Program in Asia (MAPPA), New Delhi.
- Holmes, D., and Marcus, G. M. (2012). Collaborative imperatives: A manifesto, of sorts, for the reimagination of the classic scene of fieldwork encounter. In M. Konrad (Ed.), *Collaborators collaborating: Counterparts in anthropological knowledge and international research relations* (pp. 126-144). New York and Oxford: Berghahn.
- Holmes, K., and Sweeney, B. (2003). A brief history of traditional Tibetan medicine (TTM) with recent developments and introduction to the United Kingdom. Retrieved from [http://www.saveherbalmedicine.com/shma/index.php?option=com\\_contentandview=articleandid=63andItemid=63](http://www.saveherbalmedicine.com/shma/index.php?option=com_contentandview=articleandid=63andItemid=63) on 23 February 2013.
- Hornborg, A. (2015). The political economy of technofetishism: Agency, Amazonian ontologies, and global magic. *HAU: Journal of Ethnographic Theory*, 5(1), 35-57.
- Hsu, E. (2007). The biological in the cultural: the five agents and the body ecologic in Chinese medicine. In D. Parkin and S. Ulijaszek (Eds.), *Holistic anthropology: Emergences and Divergences* (pp. 91-126). Oxford: Berghahn.
- Hsu, E. (2009). Chinese propriety medicines: An "alternative modernity?" The case of the anti-malarial substance artemisinin in East Africa. *Medical Anthropology*, 28(2), 111-140.

- Hsu, E. (2010). Plants in medical practice and common sense: On the interface of ethnobotany and medical Anthropology. In E. Hsu and S. Harris (Eds.), *Plants, health and healing. On the interface of ethnobotany and medical anthropology* (pp. 1-48). New York and Oxford: Berghahn Books.
- Hsu, E. (2010). Qing Hao (*Herba Artemisiae annuae*) in the Chinese *materia medica*. In E. Hsu and S. Harris (Eds.), *Plants, health and healing. On the interface of ethnobotany and medical anthropology* (pp. 83-130). New York and Oxford: Berghahn Books.
- Hsu, E. (2013). Afterword: On naming and the politics of practice. *East Asian Science, Technology and Society*, 7(3), 505-511.
- Hübötter, F. (1957). *Chinesisch-Tibetische Pharmakologie und Rezeptur*. Ulm/Donau: Karl P. Haug Verlag.
- Hürlimann, F. (1978). A Lamaistic formula of the treatment of peripheral arterial occlusive disease. *Praxis*, 67(38), 1-6.
- Hustak, C., and Myers, N. (2012). Involutionary momentum: Affective ecologies and the sciences of plant/insect encounters. *differences*, 23(3), 74-118.
- Ingold, T. (1983). The architect and the bee: reflections on the work of animals and men. *Man*, 18, 1-20.
- Ingold, T. (2000). *The perception of the environment. Essays on livelihood, dwelling and skill*. London and New York: Routledge.
- Ingold, T. (2011). *Being alive: essays on movement, knowledge and description*. Abingdon and New York: Routledge.
- Ingold, T. (2012). Toward an ecology of materials. *Annual Review of Anthropology*, 41(1), 427-442.
- Ingold, T. (2013a). Anthropology beyond humanity. *Suomen Antropologi*, 38(3), 5-23.
- Ingold, T. (2013b). *Making. Anthropology, archaeology, art and architecture*. London and New York: Routledge.
- Ingold, T. (2014). That's enough about ethnography! *HAU: Journal of Ethnographic Theory*, 4(1), 383-395.
- Ingold, T., and Hallam, E. (2014). Making and growing: an introduction. In E. Hallam and T. Ingold (Eds.), *Making and growing. Anthropological studies of organisms and artefacts* (pp. 1-24). Farnham: Ashgate.
- Ingold, T., and Palsson, G. (Eds.). (2013). *Biosocial becomings. Integrating social and biological anthropology*. New York: Cambridge University Press.
- Ingram, V., Ros-Tonen, M., and Dietz, T. (2015). A fine mess: Bricolaged forest governance in Cameroon. *International Journal of the Commons*, 9(1), 41-64.
- Isaac, N. J., Mallet, J., and Mace, G. M. (2004). Taxonomic inflation: its influence on macroecology and conservation. *Trends in Ecology and Evolution*, 19(9), 464-469.
- ISE. (2006, with 2008 additions). International Society for Ethnobiology: ISE code of ethics. Retrieved from <http://ethnobiology.net.code-of-ethics/> on 23 February 2013.
- Islam, G. (2015). Practitioners as theorists: Para-ethnography and the collaborative Study of contemporary organizations. *Organizational Research Methods*, 18(2), 231-251.
- Jackson, J. E. (1990). "Deja entendu": The liminal qualities of anthropological fieldnotes. *Journal of Contemporary Ethnography*, 19(1), 8-43.
- Jaiswal, Y., Liang, Z., Yong, P., Chen, H., and Zhao, Z. (2013). A comparative study on the traditional Indian Shodhana and Chinese processing methods for aconite roots by characterization and determination of the major components. *Chemistry Central Journal*, 7(1), 169.



- Jamphel, K., Wangchuk, P., Tenzin, S., Tashi, and Dorji, Y. (Eds.). (2009). *Monograph on medicinal plants of Bhutan. Volume I*. Thimphu: Institute of Traditional Medicine Services.
- Janes, C. R. (1995). The transformations of Tibetan medicine. *Medical Anthropology Quarterly*, 9(1), 6-39.
- Janes, C. R. (2002). Buddhism, science, and market: The globalisation of Tibetan medicine. *Anthropology and Medicine*, 9(3), 267-289.
- Jasanoff, S. (2004). *States of knowledge: Co-production of science and social order*. New York: Taylor and Francis.
- Jaspersen-Schib, R., Theus, L., Guirguis-Oeschger, M., Gossweiler, B., and Meier-Abt, P. J. (1996). Wichtige Pflanzenvergiftungen in der Schweiz 1966-1994: Eine Fallanalyse aus dem Schweizerischen Toxikologischen Informationszentrum (STIZ) [Acute poisonings with toxic plants in Switzerland between 1966 and 1994]. *Schweizerische medizinische Wochenschrift*, 126, 1085-1098.
- Jauregui, B. (2014). Provisional agency in India: Jugaad and legitimation of corruption. *American Ethnologist*, 41(1), 76-91.
- Jensen, C. (2004). A nonhumanist disposition: On performativity, practical ontology, and intervention. *Configurations*, 12(2), 229-261.
- Jones, S. E. (2006). *Against technology: From the Luddites to Neo-Luddism*. New York and London: Routledge.
- Johns, T. (1996). *The origins of human diet and medicine. Chemical ecology*. Tucson: University of Arizona Press.
- Kadetz, P. (2012). Endangered practices: challenging the discourse of healthcare integration. In V. Scheid and H. MacPherson (Eds.), *Integrating East Asian medicine into contemporary healthcare* (pp. 173-197). Edinburgh: Churchill Livingstone Elsevier.
- Kadetz, P. (2015a). Safety Net - The construction of biomedical safety in the global 'traditional medicine' discourse. *Asian Medicine*, 10(1-2), 1-31.
- Kadetz, P. (2015b). Manufacturing risk: reframing the discourse of safety of commodified potent substances. *Journal of Ethnopharmacology*, 167, 115-122.
- Kala, C. P., Dhyani, P. P., and Singh Sajwan, B. (2006). Developing the medicinal plant sector in northern India: challenges and opportunities. *Journal of Ethnobiology and Ethnomedicine*, 2(32).
- Kalsang, T. (2016). *Cultivation and conservation of endangered medicinal plants. Tibetan medicinal plants for health*. Dharamsala: Men-Tsee-Khang.
- Keller, K. (1994). Phytotherapy at a European level. *European Phytotelegram*, 6, 40-47.
- Kelly, J. D. (2014). Introduction: The ontological turn in French philosophical anthropology. *HAU: Journal of Ethnographic Theory*, 4(1), 259-269.
- Kern, W., Roth, H. J., Schmid, W., List, P. H., and Hörhammer, L. (Eds.). (1969). *Hagers Handbuch der pharmazeutischen Praxis: Für Apotheker, Arzneimittelhersteller, Ärzte und Medizinalbeamte*. Berlin and Heidelberg: Springer Verlag.
- Khandekar, A., and Reddy, D. S. (2015). An Indian summer: Corruption, class, and the Lokpal protests. *Journal of Consumer Culture*, 15(2), 221-247.
- Kim, J. (2007). Alternative medicine's encounter with laboratory science. *Social Studies of Science*, 37(6), 855-880.
- Kim, J. (2009). Transcultural medicine: A multi-sited ethnography on the scientific-industrial networking of Korean medicine. *Medical Anthropology*, 28(1), 31-64.

- Kirksey, E. (2015). Species: a praxiographic study. *Journal of the Royal Anthropological Institute*, 21(4), 758-780.
- Kirksey, S. E., and Helmreich, S. (2010). The emergence of multispecies ethnography. *Cultural Anthropology*, 25(4), 545-576.
- Klaassen, C. D. (2013). *Casarett and Doull's Toxicology: The basic science of poisons (8th Edition)*. New York: McGraw-Hill Education.
- Kleinman, A. (1978). Concepts and a model for the comparison of medical systems as cultural systems. *Social Science and Medicine. Part B: Medical Anthropology*, 12, 85-93.
- Kletter, C., Kriechbaum, M., and Dawa, D. (Eds.). (2001). *Tibetan medicinal plants*. Medpharm Scientific Publishers and CRC: Stuttgart and Boca Raton.
- Kloos, S. (2008). The history and development of Tibetan medicine in exile. *Tibet Journal*, 33(3), 15-49.
- Kloos, S. (2010). *Tibetan medicine in exile: The ethics, politics, and science of cultural survival*. Doctoral dissertation. University of California, San Francisco and Berkeley.
- Kloos, S. (2012). Processing exile-Tibetan identity: The alchemy of Tibetan medicine's pharmaceutical and political efficacy [article in German]. *Curare*, 35(3), 197-207.
- Kloos, S. (2013). How Tibetan medicine in exile became a "medical system". *East Asian Science, Technology and Society*, 7(3), 381-395.
- Kloos, S. (2015). (Im-)Potent knowledges: Preserving 'traditional' Tibetan medicine through modern science. In A. Beer and G. Mackenthun (Eds.), *Fugitive knowledges: The preservation and loss of knowledge in cultural contact zones* (pp. 117-136). Münster and New York: Waxmann.
- Knauff, B. (2002). Critically modern: An introduction. In B. Knauff (Ed.), *Critically modern: Alternatives, alterities, anthropologies* (pp. 1-56). Bloomington: Indiana University Press.
- Knorr Cetina, K. (1995). Laboratory studies. The cultural approach to the study of science. In S. Jasanoff, G. E. Markle, J. C. Petersen, and T. Pinch (Eds.), *Handbook of science and technology studies* (pp. 140-166). Thousand Oaks: Sage Publications.
- Knudsen, A. J. (1998). *Beyond cultural relativism? Tim Ingold's "ontology of dwelling"*. CMI Working Paper No. 7, Chr. Michelsen Institute, Bergen.
- Knudsen, S. (2014). Multiple sea snails: The uncertain becoming of an alien species. *Anthropological Quarterly*, 87(1), 59-91.
- Kohn, E. (2007). How dogs dream: Amazonian natures and the politics of transspecies engagement. *American Ethnologist*, 34(1), 3-24.
- Kohn, E. (2013). *How forests think: Toward an anthropology beyond the human*. Berkeley and Los Angeles: University of California Press.
- Kohn, E. (2014). Further thoughts on sylvan thinking. *HAU*, 4(2), 275-288.
- Kohn, E. (2015). Anthropology of ontologies. *Annual Review of Anthropology*, 44(1), 311-327.
- Kowalewski, K. (1973). Vladimir Badmajeff, Tibetan doctor in Europe. *Journal of Research in Indian Medicine*, 8(2), 101-110.
- Kroes, B. H. (2014). The legal framework governing the quality of (traditional) herbal medicinal products in the European Union. *Journal of Ethnopharmacology*, 158, Part B, 449-453.
- Kubo, T. (2009). The Problem of Identifying *Mudan* and the Tree Peony in Early China. *Asian Medicine*, 5(1), 108-145.

- Kudlu, C. (2016). Keeping the doctor in the loop: Ayurvedic pharmaceuticals in Kerala. *Anthropology and Medicine*, 1-20.
- Kumar, G. P., Kumar, R., Chaurasia, O., and Singh, S. B. (2011). Current status and potential prospects of medicinal plant sector in trans-Himalayan Ladakh. *Journal of Medicinal Plants Research*, 5(14), 2929-2940.
- Kuniyal, C. P., Kuniyal, P. C., Butola, J. S., and Sundriyal, R. C. (2013). Trends in the marketing of some important medicinal plants in Uttarakhand, India. *International Journal of Biodiversity Science, Ecosystem Services and Management*, 9(4), 324-329.
- Kuniyal, C. P., Rawat, D. S., and Sundriyal, R. C. (2015). Cultivation of *Saussurea costus* cannot be treated as 'artificially propagated'. *Current Science*, 108(9), 1587-1589.
- Kuniyal, C. P., Rawat, Y. S., Oinam, S. S., Kuniyal, J. C., and Vishvakarma, S. C. R. (2005). Kuth (*Saussurea lappa*) cultivation in the cold desert environment of the Lahaul valley, northwestern Himalaya, India: arising threats and need to revive socio-economic values. *Biodiversity and Conservation*, 14(5), 1035-1045.
- Laird, S. A. (1999). The botanical medicine industry. In K. ten Kate and S. A. Laird (Eds.), *The commercial use of biodiversity. Acces to genetic resources and benefit-sharing* (pp. 78-116). London: Earthscan.
- Laird, S. A. (2013). *Bioscience at a crossroads: Access and benefit sharing in a time of scientific, technological and industry change: The pharmaceutical industry*. Montreal, Secretariat of the Convention on Biological Diversity.
- Laird, S. A., McLain, R. J., and Wynberg, R. (Eds.). (2010). *Wild product governance. Finding policies that work for non-timber forest products*. London and Washington: Earthscan.
- Lama, Y. C., Ghimire, S. K., and Aumeeruddy-Thomas, Y. (2001). *Medicinal plants of Dolpo: Amchis' knowledge and conservation*. Kathmandu: WWF Nepal.
- Lange, D. (2006). International trade in medicinal and aromatic plants: Actors, volumes and commodities. In R. J. Bogers, L. E. Craker, and D. Lange (Eds.), *Medicinal and aromatic plants* (pp. 155-170). Springer: Dordrecht.
- Langford, J. (2002). *Fluent bodies: Ayurvedic remedies for postcolonial imbalance*. Durham, NC: Duke University Press.
- Langford, J. (2007). Dosis bodies/Docile bodies. In M. Lock and J. Farquhar (Eds.), *Beyond the body proper. Reading the anthropology of material life* (pp. 376-380). Durham and London: Duke University Press.
- Larsen, H., and Olsen, C. (2007). Unsustainable collection and unfair trade? Uncovering and assessing assumptions regarding Central Himalayan medicinal plant conservation. *Biodiversity and Conservation*, 16(6), 1679-1697.
- Larsen, H. O., and Smith, P. D. (2004). Stakeholder perspectives on commercial medicinal plant collection in Nepal. *Mountain Research and Development*, 24(2), 141-148.
- Latour, B. (1982). Give me a laboratory and I will move the world. In K. Knorr and M. Mulkay (Eds.), *Science observed. Perspectives on the social study of science* (pp. 141-170). London: Sage.
- Latour, B. (1987). *Science in action. How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.
- Latour, B. (1988, original in French 1984). *The pasteurization of France* (A. Sheridan and J. Law, Trans.). Cambridge, MA: Harvard University Press.
- Latour, B. (1996). *Petite réflexion sur le culte moderne des dieux faitiches*. Paris: Les Empêcheurs de Penser en Rond.

- Latour, B. (2000). When things strike back: a possible contribution of 'science studies' to the social sciences. *The British Journal of Sociology*, 51(1), 107-123.
- Latour, B. (2005). *Reassembling the Social: an introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Latour, B., and Woolgar, S. (1986). *Laboratory life. The construction of scientific facts*. Princeton, NJ: Princeton University Press.
- Lauer, T. (2013). "Wir sind keine kleinen Dalai Lamas". *Lebenswelten von Tibeterinnen und Tibetern der zweiten Generation in Indien und der Schweiz*. Bern: Peter Lang.
- Law, J. (2006). *Big Pharma: How the world's biggest drug companies market illness*. London: Constable.
- Law, J., and Lien, M. E. (2013). Slippery: Field notes in empirical ontology. *Social Studies of Science*, 43(3), 363-378.
- Law, J., and Lin, W.-y. (2015). Provincialising STS: Postcoloniality, symmetry and method. John Desmond Bernal Prize plenary, Denver. Retrieved from <http://heterogeneities.net/publications/LawLinProvincialisingSTS20151223.pdf> on 2 June 2016.
- Ledeneva, A. V. (2014). Economies of favours or corrupt societies: Exploring the boundaries between informality and corruption. *The Baltic Worlds*, 2014(1), 13-21.
- Lele, S., Pattanaik, M., and Rai, N. D. (2010). NTFPs in India: Rhetoric and reality. In S. A. Laird, R. J. McLain, and R. P. Wynberg (Eds.), *Wild product governance: Finding Policies that work for non-timber forest products* (pp. 85-112). London and Washington: Earthscan.
- Leslie, C. (1974). The modernization of Asian medical systems. In J. J. Poggie and R. N. Lynch (Eds.), *Rethinking modernization: anthropological perspectives* (pp. 69-108). Westport: Greenwood Press.
- Leslie, C. (1980). Medical pluralism in world perspective. *Social Science and Medicine. Part B: Medical Anthropology*, 14(4), 191-195.
- Leslie, C. (Ed.) (1976). *Asian medical systems: A comparative study*. Berkeley: University of California Press.
- Leslie, C., and Young, A. (Eds.). (1992). *Paths to Asian medical knowledge*. Berkeley: University of California Press.
- Lévy, J. J., and Garnier, c. (Eds.). (2007). *La chaîne des médicaments. Perspectives pluridisciplinaires*. Québec: Presses de l'Université du Québec.
- Lien, M. E. (2015). *Becoming salmon. Aquaculture and the domestication of a fish*. Oakland, CA: University of California Press.
- Lin, W.-y., and Law, J. (2014). A correlative STS: Lessons from a Chinese medical practice. *Social Studies of Science*, 44(6), 801-824.
- Lin, W.-y., and Law, J. (2015). We Have Never Been Latecomers!? Making knowledge spaces for East Asian technosocial practices. *East Asian Science, Technology and Society*, 9(2), 117-126.
- Lindstrom, A. (2012). First traditional Chinese medicine obtains Traditional Herbal Registration in EU. *HerbalEGram*, 9(6).
- Liu, X. M., Zou, J. Q., Sheng, Z. X., Su, G. Q., and Chen, S. L. (2009). The current global status of Chinese *materia medica*. *Phytotherapy Research*, 23(10), 1493-1495.
- Lock, M. (1993). *Encounters with ageing: Mythologies of menopause in Japan and North America*. Berkeley: University of California Press.

- Lock, M. (2001). The tempering of medical anthropology: Troubling natural categories. *Medical Anthropology Quarterly*, 15(4), 478-492.
- Lock, M., and Farquhar, J. (Eds.). (2007). *Beyond the body proper: Reading the anthropology of material life*. Durham and London: Duke University Press.
- Lynch, M. (2000). Against reflexivity as an academic virtue and source of privileged knowledge. *Theory, Culture and Society*, 17(3), 26-54.
- Lynch, M. (2013). Ontography: Investigating the production of things, deflating ontology. *Social Studies of Science*, 43(3), 444-462.
- Ma, E. (2015). Join or be excluded from biomedicine? JOINS and Post-colonial Korea. *Anthropology & Medicine*, 22(1), 64-74.
- Ma, L., Gu, R., Tang, L., Chen, Z.-E., Di, R., and Long, C. (2015). Important poisonous plants in Tibetan ethnomedicine. *Toxins*, 7(1), 138-155.
- Mader, L. S. (2013). MHRA approves registration of multi-herb Tibetan formula. *HerbalEGram*, 10(7).
- Maier, J. (2004). *Neue Wirkstoffe aus der Flora des Himalaya? Identifizierung von Diterpenalkaloiden aus Aconitum-Arten*. Doctoral dissertation. Universität Basel, Basel.
- Malhotra, K. C., and Bhattacharya, P. (2010). *Forest and livelihood*. CESS, Hyderabad.
- Marcus, G. E. (1995). Ethnography in/of the world system: The emergence of multi-sited ethnography. *Annual Review of Anthropology*, 24(1), 95-117.
- Marcus, G. E. (1997). The uses of complicity in the changing mise-en-scène of anthropological fieldwork. *Representations*(59), 85-108.
- Marcus, G. E. (1998). *Ethnography through Thick and Thin*. Princeton, NJ: Princeton University Press.
- Marks, H. M. (2013). Making Risks Visible: The Science, Politics, and Regulation of Adverse Drug Reactions. In J.-P. Gaudillière & V. Hess (Eds.), *Ways of Regulating Drugs in the 19th and 20th Centuries* (pp. 97-120). Basingstoke / New York: Palgrave MacMillan.
- Martena, M. J., van der Wielen, J. C. A., Rietjens, I. M. C. M., Klerx, W. N. M., de Groot, H. N., and Konings, E. J. M. (2010). Monitoring of mercury, arsenic and lead in traditional Asian herbal preparations on the Dutch market and estimation of associated risks. *Food Additives and Contaminants*, 27(2), 190-205.
- Martin, G. J. (2004). *Ethnobotany. A methods Manual*. London and Sterling, VA: Earthscan.
- Martin, H., and Debons, J. (2015). CAM and conventional medicine in Switzerland: Divided in theory, united in practice. In N. K. Gale and J. V. McHale (Eds.), *Routledge handbook of complementary and alternative medicine: Perspectives from social science and law* (pp. 272-291). London and New York: Routledge.
- Maurstad, A., Davis, D., and Cowles, S. (2013). Co-being and intra-action in horse–human relationships: A multi-species ethnography of be(com)ing human and be(com)ing horse. *Social Anthropology*, 21(3), 322-335.
- McIntyre, M. (2003). Can CAM come in from the cold? An update on the ongoing regulatory process with regard to herbal and acupuncture practitioners in the United Kingdom. *Journal of Alternative and Complementary Medicine*, 9(6), 809-810.
- McIntyre, M., Dixon, M., Williamson, E., Denham, A., Middleton, D., Farrant, E., . . . Mearns, A. (2015). *Public Statement from dissenting members of the Herbal Practitioner and Medicines Working Group to Department of Health (DH)*. Tewkesbury, European Herbal and Traditional medicine Practitioners Association (EHTPA).

- McMahan, D. L. (2008). *The making of modern Buddhism*. Oxford and New York: Oxford University Press.
- Menzies, N. K., and Li, C. (2010). One eye on the forest, one eye on the market: Multi-tiered regulation of matsutake harvesting, conservation and trade in North-western Yunnan province. In S. A. Laird, R. J. McLain, and R. Wynberg (Eds.), *Wild product governance. Finding policies that work for non-timber forest products* (pp. 243-264). London and Washington: Earthscan.
- Merton, R. K. (1973). The normative structure of science. In N. W. Storer (Ed.), *The sociology of science. Theoretical and empirical investigations* (pp. 267-278). University of Chicago Press: Chicago and London.
- Metcalfe, B. D., and Metcalfe, T. R. (2006). *A concise history of modern India. Second Edition*. New York: Cambridge University Press.
- MHRA. (2013). *Padma Circosan capsules: THR 39568/0001*. London, Medicines and Healthcare Products Regulatory Agency. Retrieved from [www.mhra.gov.uk/home/groups/par/documents/websiteresources/con266120.pdf](http://www.mhra.gov.uk/home/groups/par/documents/websiteresources/con266120.pdf) on 7 March 2016.
- Millard, C. (2008). The integration of Tibetan medicine in the United Kingdom: the clinics of the Tara Institute of Medicine. In L. Pordié (Ed.), *Tibetan medicine in the contemporary world. Global politics of medical knowledge and practice* (pp. 189-214). London and New York: Routledge.
- Millard, C. (2010). Illness narratives and idioms of meaning in two Tibetan medical clinics. In S. Craig, M. Cuomo, F. Garrett, and M. Schrempf (Eds.), *Studies of medical pluralism in Tibetan history and society* (pp. 61-110). Andiast: International Institute for Tibetan and Buddhist Studies.
- Miller, D. (1995). Consumption and commodities. *Annual Review of Anthropology*, 24, 141-161.
- Miller, D. (Ed.) (2005). *Materiality*. Durham and London: Duke University Press.
- Moerman, D. E. (2002). *Meaning, medicine and the 'placebo effect'*. Cambridge: Cambridge University Press.
- Mol, A. (2002). *The body multiple: ontology in medical practice*. Durham, NC: Duke University Press.
- Molvray, M. (1988). *A glossary of Tibetan medicinal plants*. *Tibetan Medicine*, 11, 1-85.
- Mullick, S. B. (2000). Gender relations and witches among the indigenous communities of Jharkhand, India. *Gender, Technology and Development*, 4(3), 333-358.
- Mulliken, T., and Crofton, P. (2008). *Review of the status, harvest, trade and management of seven Asian CITES-listed medicinal and aromatic plant species*. TRAFFIC International, Bonn.
- Myers, J. P., Zoeller, R. T., and vom Saal, F. S. (2009). A clash of old and new scientific concepts in toxicity, with important implications for public health. *Environmental Health Perspectives*, 117(11), 1652-1655.
- Nadasdy, P. (2007). The gift in the animal: The ontology of hunting and human-animal sociality. *American Ethnologist*, 34(1), 25-43.
- Nagpal, A., and Karki, M. (2004). *A study on marketing opportunities for medicinal, aromatic, and dye plants in South Asia*. Medicinal and Aromatic Plants Program in Asia (MAPPA) and International Development Research Centre (IDRC), New Delhi.
- Nappi, C. (2010). Winter worm, summer grass: *Cordyceps*, colonial Chinese medicine, and the formation of historical objects. In A. Digby, W. Ernst, and P. B. Mukharji (Eds.),

- Crossing colonial historiographies: Histories of colonial and indigenous medicines in transnational perspective* (pp. 21-36). Newcastle upon Tyne: Cambridge Scholars Publishing.
- Nappi, C. (2013). Surface tension: Objectifying ginseng in Chinese early modernity. In P. Findlen (Ed.), *Early modern things: Objects and their histories, 1500-1800* (pp. 31-52). London and New York: Routledge.
- Nazarea, V. D. (2006). Local knowledge and memory in biodiversity conservation. *Annual Review of Anthropology*, 35(1), 317-335.
- Neumann, R. P., and Hirsch, E. (2000). *Commercialisation of non-timber forest products: Review and analysis of research*. Bogor: Center for International Forestry Research.
- Nichter, M. (1996). Popular perceptions of medicine: A South Indian case study. In M. Nichter and M. Nichter (Eds.), *Anthropology and international health. Asian case studies* (pp. 203-237). University of Arizona, Tucson: Gordon and Breach Publishers.
- Nichter, M. (Ed.) (1992). *Anthropological approaches to the study of ethnomedicine*. Amsterdam: Gordon and Breach Science Publishers.
- Nichter, M., and Lock, M. (Eds.). (2002). *New horizons in medical anthropology. Essays in honour of Charles Leslie*. London: Routledge.
- Nichter, M., and Nichter, M. (1996). *Anthropology and international health: Asian case studies*. London and New York: Routledge.
- Nichter, M., and Vuckovic, N. (1994). Agenda for an anthropology of pharmaceutical practice. *Social Science and Medicine*, 39(11), 1509-1525.
- Nissen, N., and Manderson, L. (2013). Researching alternative and complementary therapies: Mapping the field. *Medical Anthropology*, 32(1), 1-7.
- NMPB. (2015). *Central sector scheme on conservation, development and sustainable management of medicinal plants: Operational Guidelines*. National Medicinal Plants Board, Ministry of AYUSH, Government of India, New Delhi.
- Novartis. (2016). *Annual report 2015*. Novartis AG, Basel. Retrieved from <https://www.novartis.com/news/annual-report-2015> on 24 April 2016.
- Nyirimigabo, E., Xu, Y., Li, Y., Wang, Y., Agyemang, K., and Zhang, Y. (2015). A review on phytochemistry, pharmacology and toxicology studies of *Aconitum*. *Journal of Pharmacy and Pharmacology*, 67(1), 1-19.
- Obringer, F. (1997). *L'Aconit et l'orpiment. Drogues et poison en Chine ancienne et médiévale*. Paris: Fayard.
- Ogden, L. A., Hall, B., and Tanita, K. (2013). Animals, plants, people, and things: A review of multispecies ethnography. *Environment and Society: Advances in Research*, 4(1), 5-24.
- Olsen, C. S., and Helles, F. (2009). Market efficiency and benefit distribution in medicinal plant markets: Empirical evidence from South Asia. *International Journal of Biodiversity Science and Management*, 5(2), 53-62.
- Olsen, C. S., and Larsen, H. O. (2003). Alpine medicinal plant trade and Himalayan mountain livelihood strategies. *Geographical Journal*, 169(3), 243-254.
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.
- PADMA. (2015). *Publikationsverzeichnis / List of publications / Liste des publications 1/2015* [index available to medical professionals via website login]. PADMA AG, Hinwil.
- Paracelsus. (1965-1968, original 1538). *Septem Defensiones: Die dritte Defension wegen des Schreibens der neuen Recepte*. In W.-E. Peukert (Ed.), *Theophrastus Paracelsus: Werke* (Vol. 2, pp. 508-513). Basel: Schwabe.

- Parfionovitch, Y., Dorje, G., and Meyer, F. (Eds.). (1992). *Tibetan medical paintings: Illustrations to the Blue Beryl treatise of Sangye Gyamtso (1653-1705)*. London: Serindia Publications.
- Pauls, T., and Franz, M. (2013). Trading in the dark – The medicinal plants production network in Uttarakhand. *Singapore Journal of Tropical Geography*, 34(2), 229-243.
- Paxson, H. (2013). *The life of cheese: Crafting food and value in America*. Berkeley: University of California Press.
- Pei, S.-J. (2002). *Ethnobotany and modernisation of traditional Chinese medicine. Paper at a workshop on wise practices and experiential learning in the conservation and management of Himalayan medicinal plants*. WWF Nepal, Kathmandu.
- Permanand, G., and Mossialos, E. (2005). The Europeanization of regulatory policy in the EU pharmaceutical sector. In M. Steffen (Ed.), *Health governance in Europe: Issues, challenges and theories* (pp. 49-80). London and New York: Routledge.
- Petryna, A., Lakoff, A., and Kleinman, A. (Eds.). (2006). *Global pharmaceuticals: ethics, markets, practices*. Durham and London: Duke University Press.
- Phuntsog, S. T. (2006). *Ancient metria medica [sic.]: Sowa-Rigpa (Tibetan Science of Healing)*. New Delhi: Paljor Publications.
- Pickering, A. (1995). *The mangle of practice. Time, agency and science*. Chicago: University of Chicago Press.
- Pickering, A. (2009). New Ontologies. In A. Pickering and K. Guzik (Eds.), *The mangle in practice: Science, society, and becoming* (pp. 1-16). Durham: Duke University Press.
- Pierce, A. R. (2010). NTFP law and policy literature: lie of the land and areas for further research. In S. A. Laird, R. J. McLain, & R. Wynberg (Eds.), *Wild product governance. Finding policies that work for non-timber forest products* (pp. 375-384). London / Washington: Earthscan.
- Pirsig, R. M. (1999, original 1974). *Zen and the art of motorcycle maintenance: An Inquiry into values. 25th Anniversary Edition*. London: Vintage.
- Pironi, A., & Torry, B. (2007). Does the taste matter? Taste and medicinal perceptions associated with five selected herbal drugs among three ethnic groups in West Yorkshire, Northern England. *Journal of Ethnobiology and Ethnomedicine*, 3(1), 21-21.
- Polanyi, M. (1966). *The Tacit dimension*. New York: Doubleday.
- Polunin, O., and Stainton, A. (1997). *Flowers of the Himalaya*. Delhi: Oxford University Press.
- Pordié, L. (2002). La pharmacopée comme expression de société. Une étude himalayenne. In J. Fleurentin, J.-m. Pelt, and G. Mazars (Eds.), *Des sources du savoir aux médicaments du futur* (pp. 183-194). Montpellier: IRD Editions, Société Française d'Ethnopharmacologie.
- Pordié, L. (Ed.) (2008a). *Tibetan medicine in the contemporary world. Global politics of medical knowledge and practice*. London and New York: Routledge.
- Pordié, L. (2008b). Tibetan medicine today: Neo-traditionalism as an analytical lens and a political tool. In L. Pordié (Ed.), *Tibetan medicine in the contemporary world. Gobaal politics of medical knowledge and practice* (pp. 3-32). London and New York: Routledge.
- Pordié, L. (2012). Sortir de l'impasse épistémologique. Nouveaux médicaments et savoirs traditionnels. *Sciences Sociales et Santé*, 30(2), 93-103.
- Pordié, L. (2014). Pervious drugs. *Asian Medicine*, 9(1-2), 49-76.
- Pordié, L. (2015). Hangover free! The social and material trajectories of PartySmart. *Anthropology and Medicine*, 22(1), 34-48.



- Pordié, L., and Gaudillière, J.-P. (2014a). The reformulation regime in drug discovery: Revisiting polyherbals and property rights in the Ayurvedic industry. *East Asian Science, Technology and Society*, 8, 57-79.
- Pordié, L., and Gaudillière, J.-P. (2014b). Introduction: Industrial Ayurveda. *Asian Medicine*, 9(1-2), 1-11.
- Pordié, L., and Hardon, A. (2015). Drugs' stories and itineraries. On the making of Asian industrial medicines. *Anthropology and Medicine*, 22(1), 1-6.
- Posey, D. (1996). *Beyond intellectual property: Toward traditional resource rights for indigenous peoples and local communities*. International Development Research Centre, Ottawa.
- Pozdneyev, A. M. (1908). *Uchebnyk tibetskoy mediciny [Textbook of Tibetan medicine]. Translated from Mongolian and Tibetan*. St. Petersburg: Imperial Russian Academy of Sciences.
- Prost, A. (2008). *Precious pills. Medicine and social change among Tibetan refugees in India*. Oxford: Berghahn Books.
- Putzel, L., Kelly, A., Cerutti, P. O., and Artati, Y. (2015). Formalization as development in land and natural resource policy. *Society and Natural Resources*, 28(5), 453-472.
- Rehmann, J. (1811). Beschreibung einer kleinen Thibetanischen Hand-Apotheke. *Journal der practischen Arzneykunde und Wundarzneykunst*, 32, 50-92.
- Reuter, K. P., Weißhuhn, T. E. R., and Witt, C. M. (2013). Tibetan medicine: A systematic review of the clinical research available in the West. *Evidence-Based Complementary and Alternative Medicine*, 2013, 16.
- Rist, L., and Schwabl, H. (2009). Komplementärmedizin im politischen Prozess: Schweizer Bevölkerung stimmt über Verfassungsartikel "Zukunft mit Komplementärmedizin" ab. *Forschende Komplementärmedizin*, 16(2), 76-78.
- Ross, A. I. (2012). *The anthropology of alternative medicine*. London: Berg.
- Rowlands, M., and Warnier, J.-P. (1988). Sorcery, power and the modern state in Cameroon. *Man*, 23(1), 118-132.
- Sabernig, K. (2007). *Kalte Kräuter und heiße Bäder. Die Anwendung der Tibetischen Medizin in den Klöstern Amdos*. Vienna: Lit Verlag.
- Sabernig, K. (2011). The substitution of rare ingredients in traditional Tibetan medicine on the basis of classical Tibetan texts, their use in modern formularies, and a case study from Amdo/Qinghai. *Curare*, 34(1-2), 83-96.
- Salick, J., Byg, A., Amend, A., Gunn, B., Law, W., and Schmidt, H. (2006). Tibetan medicine plurality. *Economic Botany*, 60(3), 227-253.
- Sallon, S., Namdul, T., Dolma, S., Dorjee, P., Dolma, D., Sadutshang, T., . . . Roberts, S. (2006). Mercury in traditional Tibetan medicine – panacea or problem? *Human and Experimental Toxicology*, 25(7), 405-412.
- Samuel, G. B. (2006). Tibetan medicine and biomedicine: Epistemological conflicts, practical solutions. *Asian Medicine*, 2(1), 72-85.
- Sanchez, A. (2012). Questioning success: Dispossession and the criminal entrepreneur in urban India. *Critique of Anthropology*, 32(4), 435-457.
- Sanchez, A. (2015). Criminal entrepreneurship: A political economy of corruption and organised crime in India. In P. M. Heywood (Ed.), *Routledge handbook of political corruption* (pp. 67-76). Oxford and New York: Routledge.
- Saper, R. B., Phillips, R. S., Sehgal, A., Khouri, N., Davis, R. B., Paquin, J., . . . Kales, S. N. (2008). Lead, mercury, and arsenic in US- and Indian-manufactured Ayurvedic

- medicines sold via the internet. *Journal of the American Medical Association*, 300(8), 915-923.
- Saxer, M. (2004). *Journeys with Tibetan medicine. How Tibetan medicine came to the West. The story of the Badmayev family*. Masters dissertation. University of Zürich, Zürich.
- Saxer, M. (2009). Herbs and traders in transit: Border regimes and the contemporary Trans-Himalayan trade in Tibetan medicinal plants. *Asian Medicine*, 5(2), 317-339.
- Saxer, M. (2011). Tibetan medicine and Russian modernities. In V. Adams, M. Schrempf, and S. R. Craig (Eds.), *Medicine between science and religion. Explorations on Tibetan grounds* (pp. 57-77). New York and Oxford: Berghahn Books.
- Saxer, M. (2012). A goat's head on a sheep's body? Manufacturing Good Practices for Tibetan medicine. *Medical Anthropology*, 31(6), 497-513.
- Saxer, M. (2013). *Manufacturing Tibetan medicine. The creation of an industry and the moral economy of Tibetanness*. New York and Oxford: Berghahn Books.
- Scannell, J. W., Blanckley, A., Boldon, H., and Warrington, B. (2012). Diagnosing the decline in pharmaceutical R&D efficiency. *Nature Reviews Drug Discovery*, 11(3), 191-200.
- Scheid, V. (2002). *Chinese medicine in contemporary China. Plurality and synthesis*. Durham and London: Duke University Press.
- Scheid, V. (2007). *Currents of tradition in Chinese medicine, 1626-2006*. Seattle, WA: Eastland Press.
- Scheid, V. (2013). Constraint 鬱 as a window on approaches to emotion-related disorders in East Asian medicine. *Culture, Medicine, and Psychiatry*, 37(1), 2-7.
- Scheid, V., and MacPherson, H. (Eds.). (2012). *Integrating East Asian medicine into contemporary healthcare*. Edinburgh: Elsevier.
- Scheper-Hughes, N., and Lock, M. M. (1987). The mindful body: A prolegomenon to future work in medical anthropology. *Medical Anthropology Quarterly*, 1(1), 6-41.
- Schippman, U., and Leaman, D. J. (2006). Cultivation and wild collection of medicinal and aromatic plants under sustainability aspects. In R. J. Bogers, L. E. Craker, and D. Lange (Eds.), *Medicinal and aromatic plants* (pp. 75-95). Dordrecht: Springer.
- Schippmann, U., Leaman, D. J., and Cunningham, A. B. (2002). Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues. In FAO (Ed.), *Biodiversity and the ecosystem approach in agriculture, forestry and fisheries*. Rome: Inter-Departmental Working Group on Biological Diversity for Food and Agriculture.
- Schlieter, J., Kind, M., and Lauer, T. (Eds.). (2014). *Die zweite Generation der Tibeter in der Schweiz: Identitätsaushandlungen und Formen Buddhistischer Religiosität*. Zürich: Seismo Verlag.
- Schulz, V., Hänsel, R., Blumenthal, M., and Tyler, V. E. (2004). *Rational Phytotherapy: A reference guide for physicians and pharmacists (Fifth edition)* (T. C. Telger, Trans.). Berlin and Heidelberg: Springer-Verlag.
- Schwabl, A., and Gämperle, E. (2013). Besondere Qualitätsaspekte von Tibetischen Arzneimitteln – Erkenntnisse aus über 40 Jahren Erfahrung in der Herstellung in der Schweiz. *Forschende Komplementärmedizin*, 20(suppl 2), 14-16.
- Schwabl, H. (2009). It is modern to be traditional: Tradition and Tibetan medicine in the European Context. *Asian Medicine*, 5(2), 373-384.
- Schwabl, H. (2013). The mercury puzzle: Tibetan medicines and the pharmaceutical regulations in the European Union – Assessments and opportunities. *Asian Medicine*, 8(1), 181-198.

- Schwabl, H., Geistlich, S., and McHugh, E. (2006). Tibetische Arzneimittel in Europa: Historische, praktische und regulatorische Aspekte. *Forschende Komplementärmedizin*, 13(S1), 1-6.
- Schwabl, H., and Vennos, C. (2008). Can Tibetan formulas be explained by Western science? Multi-target drugs and chronic inflammation: The example of Padma 28. *TTM Journal*, 2(2), 8-13.
- Schwabl, H., and Vennos, C. (2015). From medical tradition to traditional medicine: A Tibetan formula in the European framework. *Journal of Ethnopharmacology*, 167, 108-114.
- Schwabl, H., Vennos, C., and Saller, R. (2013). Tibetische Rezepturen als pleiotrope Signaturen – Einsatz von Netzwerk-Arzneien bei Multimorbidität. *Forschende Komplementärmedizin* 20(2), 35-40.
- Schwabl, H., Vennos, C., and Saller, R. (2016). *Etnomedizinische pflanzliche Heilmittel: Botanische Variabilität und trotzdem gleichbleibendes Wirkprofil*. Paper presented at the Phytotherapie-Kongress, Bonn, 2-4 June 2016.
- Seth, S. (2009). Putting knowledge in its place: Science, colonialism, and the postcolonial. *Postcolonial Studies*, 12(4), 373-388.
- Shackleton, C., Shackleton, S., and Shanley, P. (2011). Building a holistic picture: An integrative analysis of current and future prospects for non-timber forest products in a changing world. In S. Shackleton, C. Shackleton, and P. shanley (Eds.), *Non-timber forest products in the global context* (pp. 255-280). Berlin and Heidelberg: Springer.
- Shackleton, C. M., and Pandey, A. K. (2014). Positioning non-timber forest products on the development agenda. *Forest Policy and Economics*, 38, 1-7.
- Shackleton, C. M., Pandey, A. K., and Tamara, T. (Eds.). (2015). *Ecological sustainability for non-timber forest products: Dynamics and case studies of harvesting*. Abingdon: Routledge.
- Shapin, S., and Shaffer, S. (1985). *Leviathan and the air pump: Hobbes, Lock and the experimental life*. Princeton: Princeton University Press.
- Shaw, D., Graeme, L., Pierre, D., Elizabeth, W., and Kelvin, C. (2012). Pharmacovigilance of herbal medicine. *Journal of Ethnopharmacology*, 140(3), 513-518.
- Shea, J. L. (2006). Applying evidence-based medicine to traditional Chinese medicine: Debate and strategy. *Journal of Alternative and Complementary Medicine*, 12(3), 255-263.
- Shepard, G. H., Jr. (2004). A sensory ecology of medicinal plant therapy in two Amazonian societies. *American Anthropologist*, 106(2), 252-266.
- Shikov, A. N., Pozharitskaya, O. N., Makarov, V. G., Wagner, H., Verpoorte, R., and Heinrich, M. (2014). Medicinal plants of the Russian Pharmacopoeia; their history and applications. *Journal of Ethnopharmacology*, 154(3), 481-536.
- Singh, K. N., Gopichand, Kumar, A., Lal, B., and Todaria, N. P. (2008). Species diversity and population status of threatened plants in different landscape elements of the Rohtang Pass, western Himalaya. *Journal of Mountain Science*, 5(1), 73-83.
- Singhuber, J., Zhu, M., Prinz, S., and Kopp, B. (2009). *Aconitum* in traditional Chinese medicine – A valuable drug or an unpredictable risk? *Journal of Ethnopharmacology*, 126(1), 18-30.
- Sismondo, S. (2015). Ontological turns, turnoffs and roundabouts. *Social Studies of Science*, 45(3), 441-448.

- Soktsang, L. D., and Millard, C. (2013). Diversity in unity: The changing forms of Tibetan medicine. *East Asian Science, Technology and Society*, 7(3), 467-486.
- Stearn, W. T. (2004). *Botanical Latin*. Portland: Timber Press.
- Steinberg, J. (1996). *Why Switzerland?* Cambridge: Cambridge University Press.
- Subrat, N., Iyer, M., and Prasad, R. (2002). *The Ayurvedic medicine industry: Current status and sustainability*. Ecotech Services (India) Private Ltd. and International Institute for Environment and Development, New Delhi.
- Sumati Pradžnâ. (2008). "Kunpan-dudzi" (Polezny dlâ vseh èkstrakt amrity) : Bol'šoj recepturnyj spravočnik Aginskogo dacana / Sumati Pradžnâ ["Kunpan-dudzi" (Amrita extract useful for all): The comprehensive recipe reference book of the Aginsky Datsan, authored by Sumati Pradžnâ] (D. B. Dašiev, Trans. from Tibetan, with foreword, annotations and references). Ulan-Ude: Institute of General and Experimental Biology, SO Russian Academy of Sciences, Buryatian State University.
- Surkova, N., Chekhirova, G. V., Aseeva, T., Nikolaev, S., Agalzew, G., Melzer, J., . . . Saller, R. (2012). Frühe neuzeitliche Begegnungen deutschsprachiger Forscher mit der tibetischen Medizin in Sibirien. *Forschende Komplementärmedizin*, 19(3), 143-152.
- Swissmedic. (2006). Verordnung des Schweizerischen Heilmittelinstituts über die vereinfachte Zulassung von Komplementär- und Phytoarzneimitteln (Komplementär- und Phytoarzneimittelverordnung, KPAV, Doc. Ref. 812.212.24). Retrieved from <https://www.admin.ch/opc/de/classified-compilation/20051631/index.html> on 23 April 2016.
- Tewari, D. D., and Campbell, J. Y. (1995). Developing and sustaining non-timber forest products: Some policy issues and concerns with special reference to India. *Journal of Sustainable Forestry*, 3(1), 53-77.
- The Angiosperm Phylogeny Group. (2009). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Botanical Journal of the Linnean Society*, 161(2), 105-121.
- The Weleda Group, and Weleda AG. (2015). *Annual and sustainability report 2014*. Weleda, Arlesheim. Retrieved from [www.weledagroup.com/pdf/gnb\\_2014\\_en.pdf](http://www.weledagroup.com/pdf/gnb_2014_en.pdf) on 24 April 2016.
- Thomas, Y., Karki, M., Gurung, K., and Parajuli, D. (Eds.). (2005). *Himalayan medicinal and aromatic plants: Balancing use and conservation*. Kathmandu: WWF Nepal.
- Torsello, D. (2011). *The ethnography of corruption: research themes in political anthropology*. CoG Working Paper Series 2011:2. The Quality of Government Institute, University of Gothenburg, Göteborg.
- Tousignant, N. (2013). Broken tempos: Of means and memory in a Senegalese university laboratory. *Social Studies of Science*, 43(5), 729-753.
- Touwaide, A., and Appetiti, E. (2013). Knowledge of Eastern *materia medica* (Indian and Chinese) in pre-modern Mediterranean medical traditions: A study in comparative historical ethnopharmacology. *Journal of Ethnopharmacology*, 148(2), 361-378.
- TRAFFIC India. (2011). *A review of the status of Saussurea costus*. CITES Secretariat, Geneva.
- Traweek, S. (1992). *Beamtimes and lifetimes: The world of high energy physicists*. Cambridge and London: Harvard University Press.
- Tsarong, T. J. (1986). *Handbook of traditional Tibetan drugs. Their nomenclature, composition, use, and dosage*. Tibetan Medical Publications, Kalimpong.
- Tsing, A. (2014). More-than-human sociality. A call for critical description. In K. Hastrup (Ed.), *Anthropology and nature* (pp. 27-43). London and New York: Routledge.

- Tsultrim Tsona, L., and Dakpa, T. (Eds.). (2009). *Fundamentals of Tibetan medicine*. Dharamsala: Men-Tsee-Khang.
- Uehleke, B., and Saller, R. (2011). Towards a European Term for Complementary and Alternative Medicine (CAM): Complementary European Medicine (CEM). *Forschende Komplementärmedizin*, 18(2): 66-67.
- Unschuld, P. U. (1975). Zur Bedeutung der Terminus *tu* 毒 in der traditionellen medizinisch-pharmazeutischen Literatur Chinas. *Sudhoffs Archiv*, 59(2), 165-183.
- van der Geest, S., and Whyte, S. R. (1988). *The context of medicines in developing countries. Studies in pharmaceutical anthropology*. Dordrecht, Boston and London: Kluwer Academic Publishers.
- van der Geest, S., Whyte, S. R., and Hardon, A. (1996). The anthropology of pharmaceuticals: A biographical approach. *Annual Review of Anthropology*, 25, 153-178.
- van der Valk, J. M. A., Leon, C. J., & Nesbitt, M. Macroscopic authentication of Chinese materia medica (CMM): a UK market study of seeds and fruits. (In press, available online). *Journal of Herbal Medicine*. doi:http://dx.doi.org/10.1016/j.hermed.2017.03.007.
- van der Veen, M. (2014). The materiality of plants: Plant–people entanglements. *World Archaeology*, 46(5), 799-812.
- van der Veen, M., and Morales, J. (2015). The Roman and Islamic spice trade: New archaeological evidence. *Journal of Ethnopharmacology*, 167, 54-63.
- Vargas, I. (2008). Tibetan medicine revisited in the West: notes on the integrative efforts and transformative processes occurring in Massachusetts, USA. In Pordié, L. (Ed.), *Tibetan medicine in the contemporary world. Global politics of medical knowledge and practice* (pp. 215-228). London and New York: Routledge.
- Ved, D. K., and Goraya, G. S. (2008). *Demand and supply of medicinal plants in India*. NMPB and FRLHT, New Delhi and Bangalore.
- Vigh, H. E., and Sausdal, D. B. (2014). From essence back to existence: Anthropology beyond the ontological turn. *Anthropological Theory*, 14(1), 49-73.
- Wagner, H., Bladt, S., and Zgainski, E. M. (1983). *Drogenanalyse: Dünnschichtchromatographische Analyse von Arzneidrogen*. Berlin: Springer-Verlag.
- Waldram, J. B. (2000). The efficacy of traditional medicine: Current theoretical and methodological issues. *Medical Anthropology Quarterly*, 14(4), 603-625.
- Waldram, J. B. (2013). Transformative and restorative processes: Revisiting the question of efficacy of indigenous healing. *Medical Anthropology*, 32(3), 191-207.
- Waldstein, A., and Adams, C. (2006). The interface between medical anthropology and medical ethnobiology. *Journal of the Royal Anthropological Institute*, 12, S95-S118.
- Walsh, V., and Goodman, J. (2002). From taxol to taxol®: The changing identities and ownership of an anti-cancer drug. *Medical Anthropology*, 21(3-4), 307-336.
- Watson, T. J. (2008). *Sociology, work and industry (Fifth Edition)*. London and New York: Routledge.
- WCED (World Commission on Environment and Development). (1987). *Our common future*. Oxford, Oxford University Press.
- West, H. G. (2013). Thinking like a cheese: Towards an ecological understanding of the reproduction of knowledge in contemporary artisan cheese making. In R. Ellen, S. J. Lycett, and S. E. Johns (Eds.), *Understanding cultural transmission in anthropology: A critical synthesis* (pp. 320-345). New York and Oxford: Berghahn.
- Whitmarsh, I., and Roberts, E. F. S. (2016). Nonsecular medical anthropology. *Medical Anthropology*, 35(3), 203-208.

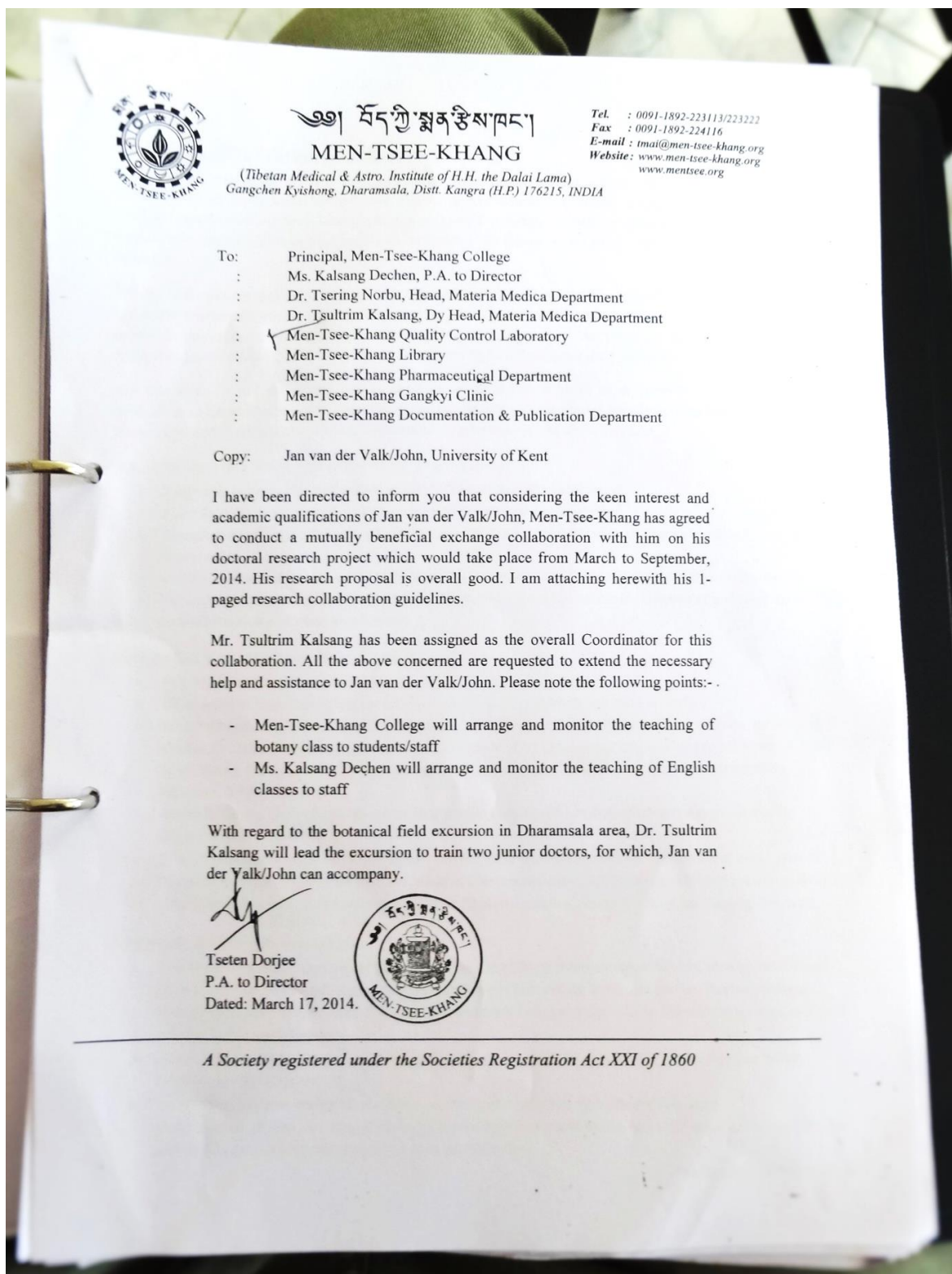
- WHO. (2013). *WHO Traditional Medicine Strategy 2014–2023*. World Health Organization, Geneva.
- Whyte, S. R., van der Geest, S., and Hardon, A. (2002). *Social lives of medicine*. Cambridge: Cambridge University Press.
- Wiesner, J. (2014). Challenges of safety evaluation. *Journal of Ethnopharmacology*, 158, Part B, 467-470.
- Williams, S. J., Martin, P., and Gabe, J. (2011). The pharmaceuticalisation of society? A framework for analysis. *Sociology of Health and Illness*, 33(5), 710-725.
- Williamson, E. M., Lorenc, A., Booker, A., and Robinson, N. (2013). The rise of traditional Chinese medicine and its *materia medica*: A comparison of the frequency and safety of materials and species used in Europe and China. *Journal of Ethnopharmacology*, 149(2), 453-462.
- Winkler, D. (2008). *Yartsa Gunbu (Cordyceps sinensis)* and the fungal commodification of Tibet's rural economy. *Economic Botany*, 62(3), 291-305.
- Winkler, D. (2009). Caterpillar fungus (*Ophiocordyceps sinensis*) production and sustainability on the Tibetan Plateau and in the Himalayas. *Asian Medicine*, 5(2), 291-316.
- Winterbottom, A. E. (2015). Of the China Root: A case study of the early modern circulation of *materia medica*. *Social History of Medicine*, 28(1), 22-44.
- Witsoe, J. (2011). Corruption as power: Caste and the political imagination of the postcolonial state. *American Ethnologist*, 38(1), 73-85.
- Witt, C., Craig, S., and Cuomo, M. (Eds.). (2012). *Tibetan medicine research - From current evidence to future strategies: Advice from an interdisciplinary conference*. Essen: KVC Verlag and Karl und Veronica Carstens-Stiftung.
- Wollenberg, E., and Ingles, A. (Eds.). (1998). *Incomes from the forest: Methods for the development and conservation of forest products for local communities*. Bogor, Indonesia: CIFOR.
- Woolgar, S., and Lezaun, J. (2013). The wrong bin bag: A turn to ontology in science and technology studies? *Social Studies of Science*, 43(3), 321-340.
- Wu, Z., Raven, P. H., and Hong, D. (Eds.). (1994 onwards). *Flora of China*. Beijing and St. Louis: Science Press and Missouri Botanical Garden.
- Wujastyk, D., and Smith, F. M. (Eds.). (2008). *Modern and global Ayurveda: Pluralism and paradigms*. Albany: State University of New York Press.
- Wylie, T. (1959). A standard system of Tibetan transcription. *Harvard Journal of Asiatic Studies*, 22, 261-267.
- Wynberg, R., Laird, S. A., van Niekerk, J., and Kozanayi, W. (2015). Formalization of the natural product trade in Southern Africa: Unintended consequences and policy blurring in biotrade and bioprospecting. *Society and Natural Resources*, 28(5), 559-574.
- Yang, F.-S., Qin, A.-L., Li, Y.-F., and Wang, X.-Q. (2012). Great genetic differentiation among populations of *Meconopsis integrifolia* and its implication for plant speciation in the Qinghai-Tibetan Plateau. *PLoS ONE*, 7(5), e37196.
- Yates-Doerr, E. (2015). Does meat come from animals? A multispecies approach to classification and belonging in highland Guatemala. *American Ethnologist*, 42(2), 309-323.
- Yoeli-Tlalim, R. (2012). Re-visiting 'Galen in Tibet'. *Medical History*, 56(3), 355-365.

- Zhan, M. (2009). *Other-worldly: Making Chinese medicine through transnational frames*. Durham and London: Duke University Press.
- Zhao, Z., Guo, P., & Brand, E. (2012). The formation of daodi medicinal materials. *Journal of Ethnopharmacology*, 140(3), 476-481.
- Zick, S. M., Schwabl, H., Flower, A., Chakraborty, B., and Hirschhorn, K. (2009). Unique aspects of herbal whole system research. *Explore: The Journal of Science and Healing*, 5(2), 97-103.
- Zimmermann, F. (1988). The jungle and the aroma of meats: An ecological theme in Hindu medicine. *Social Science and Medicine*, 27(3), 197-215.
- Zimmermann, F. (1992). Gentle purge: The Flower Power of Ayurveda. In C. Leslie and A. Young (Eds.), *Paths to Asian medical knowledge* (pp. 209-223). Berkeley: University of California Press.

### Tibetan sources

- Dawa. (2003). *Bod kyi gso ba rig pa las sman rdzas sbyor bzoi lag len gsan sgo byed pai lde mig [Key to practical procedures on the compounding of Tibetan medicines]*. New Delhi: Archana.
- Gawé Dorjé. (1995). *'Khrung dpe dri med shel gyi me long [Stainless crystal mirror of medicinal plant classification]*. Chamdo Region Mentsikhang.
- Khyenrap Norbu. (2007, early 20th century). *Lag len nyer mgo'i sman gyi sbyor dpe bdud rtsi'i bum bzang [Excellent vase of elixirs] Mkhyen rab nor bu'i sman yig gces btus. ma yang sman yig gces btus* (pp. 144-182). Qinghai: Arura.
- Lobzang Shérab (Sumati Prajna). (1924, based on 18th century manuscript). *Sman sbyar tshad kyi skor rnams che long tsham phyogs gcig tu bkod pa kun phan bdud rtsi'i snying po [The large formulary of the Aginsk Datshang called 'Amrita extract beneficial for all: Collection of basic formulas with dosages']*. Xylographic edition of the Aginsk Printing House. Woodblock print of 151 folios. Retrieved from PADMA AG's library.
- Penpa Tsering. (2013). *Rgyun mgo'i bod sman gyi phen yon lag theb [Handbook enumerating the principal Tibetan medicines, with their virtues]*. Dharamsala: Men-Tsee-Khang.
- Tenzin Phuntsok. (1970, based on 17<sup>th</sup> century manuscript). *Lag len gces rigs bsdus pa sman kun bcud du bsgrub pa'i las kyi cho ga kun gsar snang mdzod [Precious collection of practical procedures]*. In T.Y. Tashigang (Ed.), *Principles of lamaist pharmacognosy: Being the texts of the dri med shel gong, dri med shel phreng, and the lag len gces bsdus*. Photographic reproduction of Lhasa Chagpori woodblocks. Delhi: Jayyed Press.
- Tsultrim Kalsang. (2008). *Bod kyi gso rig dang a yur ye dha krung dbya'i sman gzhung btsas las bstan pa'i skye dngos sman rdzas kyi dpar ris dang lag len gces btus blo gsar rig pa'i sgo 'byed [Introduction to new wisdom on the herbal materia medica of Sowa Rigpa and Ayurveda]*. Dharamsala: Men-Tsee-Khang.

# Appendix I



ཨ། བོད་ཀྱི་སྐྲན་ཚུ་ས་ཁང་།

**MEN-TSEE-KHANG**

(Tibetan Medical & Astro. Institute of H.H. the Dalai Lama)  
Gangchen Kyishong, Dharamsala, Distt. Kangra (H.P.) 176215, INDIA

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www.mentsee.org

To: Principal, Men-Tsee-Khang College  
: Ms. Kalsang Dechen, P.A. to Director  
: Dr. Tsering Norbu, Head, Materia Medica Department  
: Dr. Tsultrim Kalsang, Dy Head, Materia Medica Department  
: Men-Tsee-Khang Quality Control Laboratory  
: Men-Tsee-Khang Library  
: Men-Tsee-Khang Pharmaceutical Department  
: Men-Tsee-Khang Gangkyi Clinic  
: Men-Tsee-Khang Documentation & Publication Department

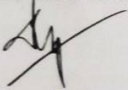
Copy: Jan van der Valk/John, University of Kent

I have been directed to inform you that considering the keen interest and academic qualifications of Jan van der Valk/John, Men-Tsee-Khang has agreed to conduct a mutually beneficial exchange collaboration with him on his doctoral research project which would take place from March to September, 2014. His research proposal is overall good. I am attaching herewith his 1-paged research collaboration guidelines.

Mr. Tsultrim Kalsang has been assigned as the overall Coordinator for this collaboration. All the above concerned are requested to extend the necessary help and assistance to Jan van der Valk/John. Please note the following points:-

- Men-Tsee-Khang College will arrange and monitor the teaching of botany class to students/staff
- Ms. Kalsang Dechen will arrange and monitor the teaching of English classes to staff

With regard to the botanical field excursion in Dharamsala area, Dr. Tsultrim Kalsang will lead the excursion to train two junior doctors, for which, Jan van der Valk/John can accompany.

  
Tseten Dorjee  
P.A. to Director  
Dated: March 17, 2014.



*A Society registered under the Societies Registration Act XXI of 1860*





### Research collaboration guideline

As a way of supporting the valuable work carried out by the Tibetan Medical and Astro Institute, and in the spirit of collegiality and mutually beneficial exchange, this research collaboration guideline was drafted. It aims to make sure that both parties involved (Men-Tsee-Khang and Jan van der Valk/John, University of Kent) understand each other's expectations, and to maximise the benefits for both sides. This document is open for discussion and re-evaluation if agreed so.

This doctoral research project on Tibetan materia medica will take place March – September 2014, when John will be present in Dharamsala (except June for conference in Bhutan, renewal of visa in Belgium). The PhD is planned to be written by the academic year 2015/2016. The study focuses on the use of four plants in Tibetan medicines, namely Arura (*Terminalia chebula*), Ruta (*Saussurea lappa*), Tsher Ngön (*Meconopsis* spp.), and Bong Nga (*Aconitum* spp.).

The information I will gather will not be used for other purposes (such as economical goals) than research publication and presentation. Men-Tsee-Khang has the right to restrict certain photographs or specific information from publication to protect the medical, cultural and economic purposes of the Institute.

#### What Mr van der Valk can offer Men-Tsee-Khang

- Teach botany classes to staff and/or students (1 hour/day, Monday-Friday)
- Teach English classes to staff and/or students (1 hour/day, Monday-Friday)
- Assist in final editing of Dr Kalsang's official book publication on cultivation of Tibetan medicinal plants (5 hours/week)
- Provide on-demand assistance for English writing, translation and botanical questions (1-2 hours/week)
- Do voluntary manual work at quality control laboratory (I have the necessary knowledge and training, see CV) and pharmacy, if and when appropriate

#### Requested support from Men-Tsee-Khang

- Free access to library and herbarium, to do research on 4 studied plants
- Office space at Men-Tsee-Khang, to facilitate teaching, interviewing and other activities
- Working hours to conduct interviews with Men-Tsee-Khang staff from the following departments: Materia Medica (Dr. Tsultrim Kalsang, 5 hours/week), Quality Control Laboratory (one quality control researcher, <sup>1-2</sup> ~~one~~ hours/week), Pharmacy (one pharmacist/pharmacy worker, <sup>one</sup> ~~one~~ 1-2 hours/week), Clinic (one prescribing physician, <sup>one</sup> ~~one~~ 1-2 hours/week)
- Access to Quality Control Laboratory, to observe (and assist, will not disturb on-going work) in quality assurance (<sup>one</sup> ~~2~~ days/week)
- \* Access to Pharmacy, to observe (and assist, will not disturb on-going work) in production of pills (<sup>Need written permit per visit</sup>)
- ~~Opportunity to go on botanical field excursion in Dharamsala area (e.g. Triund) and to visit medicinal plant cultivation projects, to look for and photograph Tibetan medicinal plants (Dr. Tsultrim Kalsang, 3-5 days)~~ <sup>see note</sup>

#### Outcomes of the collaboration

- PhD thesis with explicit acknowledgement of Men-Tsee-Khang (relevant departments, citation of involved doctors), PDF and 2 printed copies will be given to Men-Tsee-Khang library, and to Dr. Tsultrim Kalsang
- Photographs taken at Men-Tsee-Khang and on botanical field excursion will be shared, can be used in future publications, or website, etc.
- A report that summarises the research will be written for publication in a Men-Tsee-Khang journal or newsletter, if appropriate
- Publication(s) in peer-reviewed academic journal, co-authored by Men-Tsee-Khang staff
- A relationship of trust and mutually beneficial exchange that could be the basis of further collaboration (also with my contacts, for example Royal Botanic Gardens Kew)

Dharamsala, 14 March 2014

# Appendix II

## SECURITY AGREEMENT

made and entered into on this day of 1<sup>st</sup> February 2014

(hereinafter „DATE HEREOF“)

by and between

PADMA AG  
Unterfeldstrasse 1, CH-8340 Hinwil  
Switzerland  
(hereinafter „PADMA“)

and

Mr Jan Van der Valk  
Maastrichterstraat 32  
3770 Riemst  
Belgium  
jvdv3003@gmail.com, jmv3@kent.ac.uk  
(hereinafter „JVDV“)

Recitals

- a) JVDV is presently PhD Candidate / Graduate Teaching Assistant studying at the University of Kent.
- b) For his thesis and later research work on Tibetan Medicine he is interested to study and research about the production processes and techniques of PADMA (the research project). For his studies JVDV receives confidential information about the products and the business of PADMA. JVDV shall keep secret all this confidential information. This secrecy agreement includes all information that was exchanged prior to this agreement.

Therefore, the parties agree as follows

1. JVDV might get an insight into information related to PADMA's business sphere, including, but not limited to formulas, production procedures, product related know-how, client and business relationships, distribution channels, schemes of calculation etc. (hereinafter the INFORMATION). All this INFORMATION as well its storage and/or registration on data carriers of any kind shall be considered as confidential regardless of its explicit declaration as such and/or regardless of its eventual registration or protection by a patent.
2. JVDV shall refrain from using any of the INFORMATION for his own account for commercial purposes (or for the account of related persons) and from disclosing it to non-research oriented third parties. JVDV shall neither make nor keep any copies, transcriptions, registrations, photographs etc. of the INFORMATION unless explicitly authorized by PADMA. In that case, JVDV shall hand over any transcriptions, copies etc. in its possession to PADMA on first demand without keeping any copies or reproductions.
3. JVDV shall solely use the INFORMATION for the purposes set out in the recitals. For this purpose JVDV will make or keep copies, transcriptions, handnotes, audiorecordings, photographs etc. of the INFORMATION. If there is a dispute JVDV shall hand over any transcriptions, copies etc. in its possession to PADMA on first demand without keeping any copies or reproductions.

4. JVDV's duties set out in clauses 2. and 3. hereof shall be in effect regardless of the circumstances and the way of acquirement of the INFORMATION and shall be valid both during as well as after termination of the research project without any timely or local limitation and regardless of the reasons and circumstances of the termination of the research project.
5. JVDV's duties set out in this agreement shall not apply to
  - a. INFORMATION already in public knowledge on the DATE HEREOF or
  - b. INFORMATION subsequently published upon authorization by PADMA.
6. JVDV shall at any time disclose to PADMA all persons with whom he shared INFORMATION on first demand.
7. JVDV shall show before publication in whatever form (thesis, research article, communication, written or in electronic form) the paragraphs, statements or photographs concerning PADMA. PADMA can object or modify such paragraphs, statements or photographs. JVDV will accept the changes and implement them. Otherwise JVDV will describe the research in a way that no connection can be made between the description and PADMA.
8. This secrecy agreement shall not be construed as a mandate. The provisions hereof shall not commit either party to enter into any other agreement.
9. In case of breach of contract by JVDV, PADMA shall be entitled to liquidated damages of CHF 5'000 aside from compensation for any damage in excess of said amount according to art. 97 of the Swiss Code of Obligations. The amount of liquidated damages shall not be appropriated to the payment of compensation of the higher damage.
10. This agreement as well as lawsuits resulting thereof are subject to Swiss law. The parties agree upon the Commercial Court („Handelsgericht“) of Zurich as legal venue.

Accepted and signed:

PADMA AG



Dr. Herbert Schwabl

JVDV



Jan Van Der Valk