



Kent Academic Repository

Pethick, Stephen, Wass, Mark N. and Michaelis, Martin (2025) *Cell culture pioneer Jaroslav Cinatl—the pursuit and defence of truth*. FEBS Letters, 599 (24). pp. 3563-3568. ISSN 0014-5793.

Downloaded from

<https://kar.kent.ac.uk/111779/> The University of Kent's Academic Repository KAR

The version of record is available from

<https://doi.org/10.1002/1873-3468.70204>

This document version

Author's Accepted Manuscript

DOI for this version

Licence for this version

UNSPECIFIED

Additional information

Versions of research works

Versions of Record

If this version is the version of record, it is the same as the published version available on the publisher's web site. Cite as the published version.

Author Accepted Manuscripts

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding. Cite as Surname, Initial. (Year) 'Title of article'. To be published in **Title of Journal**, Volume and issue numbers [peer-reviewed accepted version]. Available at: DOI or URL (Accessed: date).

Enquiries

If you have questions about this document contact ResearchSupport@kent.ac.uk. Please include the URL of the record in KAR. If you believe that your, or a third party's rights have been compromised through this document please see our [Take Down policy](https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies) (available from <https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies>).

Cell culture pioneer Jaroslav Cinatl - The Pursuit and Defence of Truth

Stephen Pethick¹, Mark N. Wass², Martin Michaelis^{2,3*}

¹ Kent Law School, University of Kent, Canterbury, UK

² School of Natural Sciences, University of Kent, Canterbury, UK

³ Dr Petra Joh Research Institute, Frankfurt am Main, Germany

*Correspondence: M.Michaelis@kent.ac.uk

Jaroslav Cinatl, who passed away in Frankfurt on 12 June 2025 at the age of 96, was a mammalian cell culture pioneer, who has left an enduring legacy. Cinatl pursued science under the constraints of a totalitarian regime that subordinated empirical research to political ideology, yet he remained steadfast in his commitment to truth at a significant personal and professional cost.

Cinatl was born on 4 January 1929 in Treboň, Czechoslovakia. In February 1948, the Communist Party of Czechoslovakia (KSČ) toppled the democratic Czechoslovakian government in a Soviet-backed coup d'état, throwing the country into totalitarian dictatorship. At the time, Jaroslav Cinatl was a medical student, whose studies were financed by profit from the family's bakery (Figure 1). Following the establishment of the socialist regime the family bakery was nationalised, and so Cinatl, supportive of the new government, enlisted in the military to continue his medical education. Despite his ideological commitment, it was here that Cinatl first came into conflict with the prevailing orthodoxy, refusing to withdraw his laboratory results when they contradicted the ideological dogma of Soviet-aligned scientists.

Figure 1



Figure 1. The bakery of the Cinatl family. Jaroslav Cinatl (second from the left) holds the hand of his grandfather (first from the left). Jaroslav's father wears an apron and a cap (fourth from the left). Jaroslav's mother stands next to Jaroslav's father (fifth from the left).

Soviet-dominated research had been shaped by ideologists like Trofim Lysenko, who rejected Mendelian genetics and whose pseudoscientific claims about environmentally acquired inheritance became official doctrine under Stalin. Lysenkoism led to agricultural collapse, millions of deaths, and the systematic persecution of dissenting scientists [Soyfer, 2001; Hagemann, 2002; Borinskaya et al., 2019]. Cinatl clashed directly with ideological science through his criticism of the work of Olga Lepeshinskaya, a protégé of Lysenko.

Lepeshinskaya sought fraudulently to demonstrate that living matter could arise spontaneously from inanimate material by playing films of dying cells in reverse [Rapoport et al., 1991; Grant, 2007]. When Cinatl failed to replicate Lepeshinskaya's alleged results as a medical student in the Biology Department of the Medical Faculty in Prague and the Military Medical Academy in Hradec Králové, he was ordered to recant his findings. He refused to do so and lodged a formal complaint with the Central Committee of the Communist Party of Czechoslovakia (Figure 1). Despite calls to expel him from his medical degree, after a disciplinary hearing he was allowed to complete his studies but prevented from continuing his research.

Figure 2

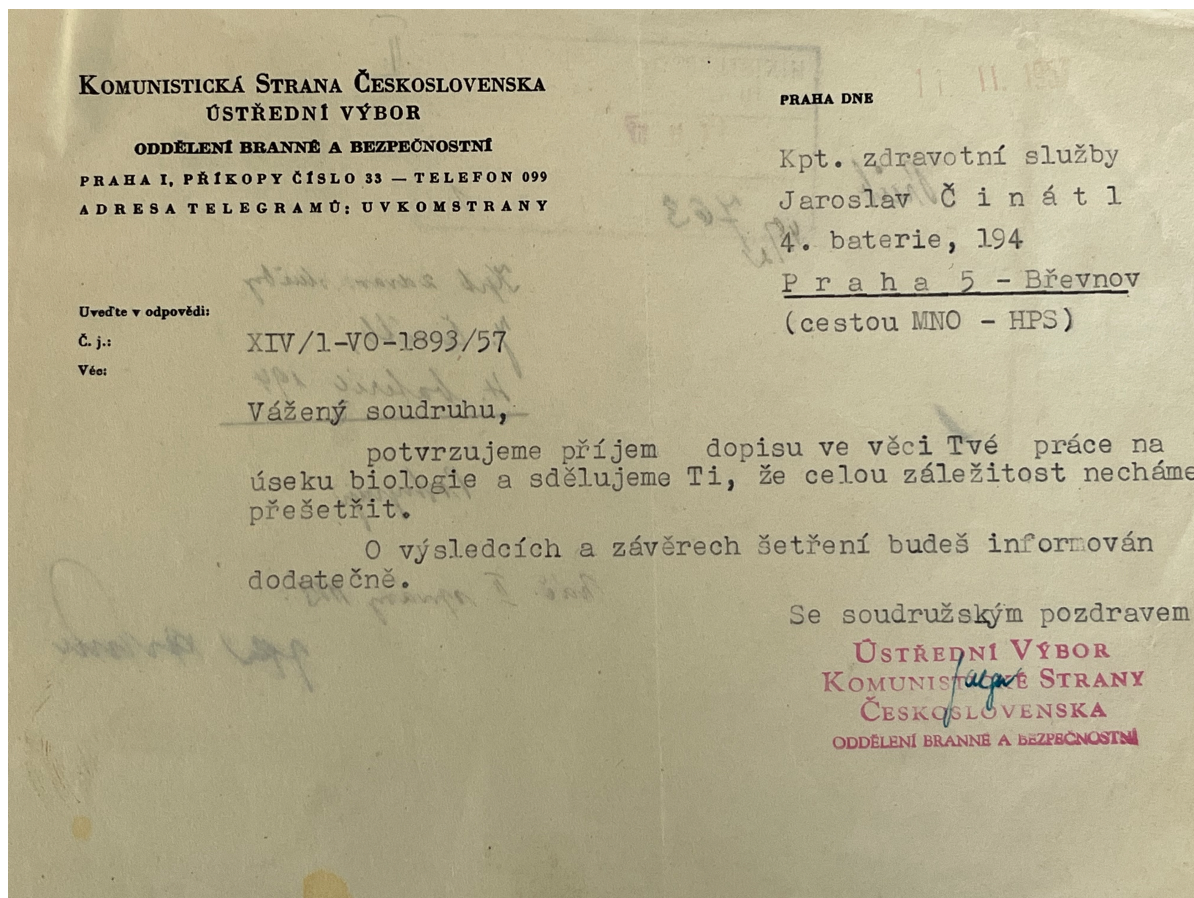
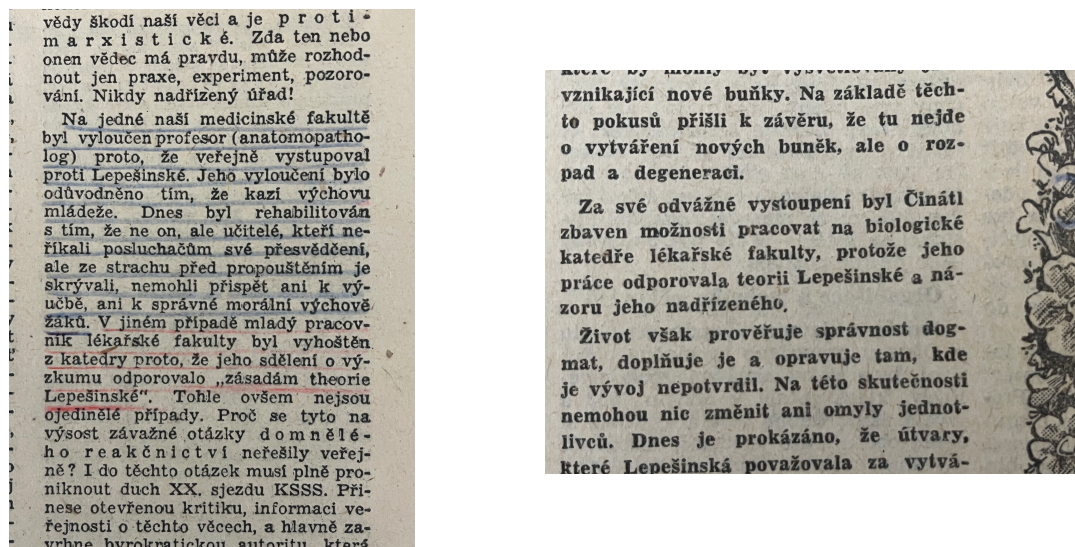


Figure 2. Confirmation of receipt of the complaint of Jaroslav Cinatl to the Central Committee of the Communist Party, English translation: “Dear Comrade, We acknowledge the receipt of your letter regarding your work in the biology department and inform you that we will have the entire matter investigated. You will be informed of the results and conclusions of the investigation later. With comradely greetings, Central Committee of the Communist Party of Czechoslovakia”

After Stalin's death in 1953, Cinatl's case was revisited and received coverage in the Czech press (Figure 2).

Figure 3



Literarní Noviny
(Literary Newspaper)
17th March 1956

Zdravotnické Noviny
(Medical Newspaper)
28th April 1956

Figure 3. Coverage of the case of Jaroslav Cinatl in the media in 1956. A) Literarní Noviny (Literary Newspaper), English translation: “At one of our medical faculties, a professor (anatomist/ pathologist) was expelled because he spoke out publicly against Lepeshinskaya. His expulsion was justified by the fact that he was spoiling the education of the youth. Today he was rehabilitated, saying that not he, but the teachers, who did not tell their students their beliefs, but hid them for fear of being fired, could not contribute either to teaching or to the correct moral education of students. In another case, a young employee of the medical faculty was expelled from the department because his statement about research contradicted the “principles of Lepeshinskaya’s theory”. B) Zdravotnické Noviny (Medical Newspaper), English translation: “For his courageous speech, Činatl was deprived of the opportunity to work at the biology department of the medical faculty, because his work contradicted Lepeshinskaya's theory and the opinion of his superior.”

Continuing his scientific work at the Military Institute of Hygiene, Epidemiology and Microbiology in Prague, Cinatl made important contributions to virus cultivation in cell culture [Benda & Cinatl, 1966; Hronovský et al., 1966; Benda et al., 1970] (Figure 4). He also resumed his research on the origin of life and identified calcium-based structures forming in dying cells, that he postulated to be linked to organ calcification and the formation of

complexes of inorganic and organic molecules with a role in the origin of life [Cinatl et al. 1966; Cinatl, 1967A]. After his findings were not accepted by domestic journals, Cinatl secretly submitted a manuscript to *Nature*, which was accepted and published in 1967 [Cinatl et al., 1967B]. As a sanction, his work on the topic was stopped, but he defied the order by secretly publishing a follow-up article under his private address in the *Journal of Theoretical Biology* [Cinatl, 1969].

Figure 4



Figure 4. Images of Jaroslav Cinatl. A) Jaroslav Cinatl in military uniform (first from the right). B) Jaroslav Cinatl with lab coat at a microscope.

After the 1968 Soviet-led invasion of Czechoslovakia and the suppression of the Prague Spring, Cinatl, in common with all senior military officers and Party members, was required to support the intervention in a loyalty test. This he refused to do, rejecting any endorsement of the Soviet-led intervention. Many influential friends and colleagues attempted to change his mind, and presented the test as a formality of no importance. His wife pleaded with him to reconsider his stance. He remained adamant, however, that he could not act against his conscience and sense of what is right. This refusal to support or at least condone the Soviet crushing of the Prague Spring, led to Jaroslav Cinatl's expulsion from the Communist Party and the army, resulting in severe consequences for him and his family. Cinatl suddenly found himself demoted to a position as a subordinate research assistant at the Institute of Haematology and Blood Transfusion. This demotion brought loss of status and privilege, and came with a greatly reduced salary. His actions also led in turn amongst other things to the denial of educational opportunities for his son, Jindrich.

Despite these setbacks, Cinatl persevered, establishing himself as a preeminent cell culture expert, making seminal contributions to the development of permanent cell lines and the *in vitro* cultivation of haematopoietic stem cells [Cinatl et al., 1977; Michalová et al., 1977; Ponka et al., 1978; Malasková et al., 1979; Cinatl et al., 1981; Stöckbauer et al., 1981; Necas & Cinatl, 1982]. The latter earned him a second publication in *Nature* in 1982 [Cinatl et al., 1982]. Cinatl visited his daughter in West Germany in that year and remained in the West. In the Department of Paediatrics at Goethe University in Frankfurt am Main, his interactions with families of paediatric cancer patients led to the founding of the Interdisciplinary Laboratory for Tumour and Virus Research in the late 1980s, which continues today as part of the Dr Petra Joh Research Institute of the Frankfurt Foundation for Children with Cancer.

Cinatl's legacy was extended through his son, Jindrich, who trained under his father's direct tutelage from early childhood. During the 2002-2003 SARS outbreak, Jindrich was the first scientist to cultivate SARS-CoV, providing the crucial step in identifying the causative pathogen [Cinatl et al., 2003; Drosten et al., 2003]. This also equipped Jindrich to isolate SARS-CoV-2 early during the COVID-19 pandemic, enabling seminal contributions to SARS-CoV-2 research [Cinatl et al., 2004; Bojkova et al., 2020; Hoehl et al., 2020; Klann et al., 2020; Bojkova et al., 2023]. Moreover, Jaroslav's work laid the foundation for the establishment by his son of the Resistant Cancer Cell Line (RCCL) collection [Michaelis et al., 2019], a unique collection of 3,000 drug-adapted cancer cell lines.

In his later years, Jaroslav Cinatl continued to work, establishing new cancer cell lines and maintaining a presence in the laboratory until the final month of his life [Thomas et al., 2021; Thomas et al., 2022; Winkelmann et al., 2022]. He had become a celebrated figure in the Czech scientific community. One colleague described the experience of entering a room with him as akin to walking in "accompanied by Satchmo" [M. Michaelis, personal communication].

Cinatl passed away on 20 June 2025. He is survived by a scientific legacy that spans continents and generations, his career standing as a testament to the power of moral clarity and intellectual courage in the face of authoritarian constraint. At a time when scientific discourse faces renewed challenges - from political interference and performative careerism to the corrosive influence of misinformation - Jaroslav Cinatl's life offers a rallying counterpoint. His commitment to scientific integrity and method, pursued under threat and duress, is a beacon for the importance of scientific independence, reminding us that truth in science is not only to be discovered, but also defended.

Dr Jaroslav Cinatl, cell biologist: 04/01/1929 – 12/06/2025.

Acknowledgement

We thank Sona Hlaves and Jindrich Cinatl for access to Jaroslav Cinatl's Nachlass.

References

- Benda R, Cinátl J. Isolation of two plaque variants from the prototype strain of B virus (Herpesvirus simiae). *Acta Virol.* 1966 Mar;10(2):178.
- Benda R, Danes L, Cinátl J. Infection of rabbit alveolar macrophages with a neurotropic vaccinia virus strain in vitro. *Acta Virol.* 1970 Sep;14(5):353-61.
- Bojkova D, Klann K, Koch B, Widera M, Krause D, Ciesek S, Cinatl J, Münch C. Proteomics of SARS-CoV-2-infected host cells reveals therapy targets. *Nature.* 2020 Jul;583(7816):469-472. doi: 10.1038/s41586-020-2332-7.
- Bojkova D, Reus P, Panosch L, Bechtel M, Rothenburger T, Kandler JD, Pfeiffer A, Wagner JUG, Shumliakivska M, Dimmeler S, Olmer R, Martin U, Vondran FWR, Toptan T, Rothweiler F, Zehner R, Rabenau HF, Osman KL, Pullan ST, Carroll MW, Stack R, Ciesek S, Wass MN, Michaelis M, Cinatl J Jr. Identification of novel antiviral drug candidates using an optimized SARS-CoV-2 phenotypic screening platform. *iScience.* 2023 Feb 17;26(2):105944. doi: 10.1016/j.isci.2023.105944.
- Borinskaya SA, Ermolaev AI, Kolchinsky EI. Lysenkoism Against Genetics: The Meeting of the Lenin All-Union Academy of Agricultural Sciences of August 1948, Its Background, Causes, and Aftermath. *Genetics.* 2019 May;212(1):1-12. doi: 10.1534/genetics.118.301413.
- Cinátl J, Liebl V, Hurych J, Tupý J, Michalec C, Kourílek K. Structures occurring in aging serum. II. *Pathol Microbiol (Basel).* 1966;29(4):470-9. doi: 10.1159/000161929.
- Cinátl J. Initiation of structures by nuclei of dead cells. *Exp Cell Res.* 1967A Aug;47(1):123-31. doi: 10.1016/0014-4827(67)90216-9.
- Cinátl J, Sprincl L, Kourílek K. Calcification of cell nuclei in experimental necrosis in vivo. *Nature.* 1967B Dec 9;216(5119):1011-3. doi: 10.1038/2161011a0.
- Cinátl J. Inorganic-organic multimolecular complexes of salt solutions, culture media and biological fluids and their possible significance for the origin of life. *J Theor Biol.* 1969 Apr;23(1):1-10. doi: 10.1016/0022-5193(69)90063-0.
- Cinátl J, Korcáková L, Svobodová J, Lostický C, Hasková V. Effect of calf thymus histone and its fractions F2 and F3 on human lymphocyte stimulation by phytohaemagglutinin. *Folia Biol (Praha).* 1977 Jan;23(1):35-9.
- Cinátl J, Lemez P, Hermanová E, Chudomel V, Neuwirtová R, Neuwirt J, Zivný J, Necas E. Human placental conditioned medium (from different phase of pregnancy) as a source of colony-stimulating activity for cultures of human and mouse. granulocyte-macrophage colony-forming cells in semisolid agar. *Folia Biol (Praha).* 1981;27(3):186-93.
- Cinátl J, Paluska E, Chudomel V, Malasková V, Elleder M. Culture of macrophage cell lines from normal mouse bone marrow. *Nature.* 1982 Jul 22;298(5872):388-9. doi: 10.1038/298388a0.

Cinatl J, Morgenstern B, Bauer G, Chandra P, Rabenau H, Doerr HW. Glycyrrhizin, an active component of liquorice roots, and replication of SARS-associated coronavirus. *Lancet*. 2003 Jun 14;361(9374):2045-6. doi: 10.1016/s0140-6736(03)13615-x.

Cinatl J Jr, Hoever G, Morgenstern B, Preiser W, Vogel JU, Hofmann WK, Bauer G, Michaelis M, Rabenau HF, Doerr HW. Infection of cultured intestinal epithelial cells with severe acute respiratory syndrome coronavirus. *Cell Mol Life Sci*. 2004 Aug;61(16):2100-12. doi: 10.1007/s00018-004-4222-9.

Drosten C, Günther S, Preiser W, van der Werf S, Brodt HR, Becker S, Rabenau H, Panning M, Kolesnikova L, Fouchier RA, Berger A, Burguière AM, Cinatl J, Eickmann M, Escriu N, Grywna K, Kramme S, Manuguerra JC, Müller S, Rickerts V, Stürmer M, Vieth S, Klenk HD, Osterhaus AD, Schmitz H, Doerr HW. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *N Engl J Med*. 2003 May 15;348(20):1967-76. doi: 10.1056/NEJMoa030747.

Hagemann R. How did East German genetics avoid Lysenkoism? *Trends Genet*. 2002 Jun;18(6):320-4. doi: 10.1016/S0168-9525(02)02677-X.

Hoehl S, Rabenau H, Berger A, Kortenbusch M, Cinatl J, Bojkova D, Behrens P, Böddinghaus B, Götsch U, Naujoks F, Neumann P, Schork J, Tiarks-Jungk P, Walczok A, Eickmann M, Vehreschild MJGT, Kann G, Wolf T, Gottschalk R, Ciesek S. Evidence of SARS-CoV-2 Infection in Returning Travelers from Wuhan, China. *N Engl J Med*. 2020 Mar 26;382(13):1278-1280. doi: 10.1056/NEJMc2001899.

Hronovský V, Benda R, Cinátl J. Propagation of street rabies virus in primary cultures of dog kidney cells. *Acta Virol*. 1966 Mar;10(2):181.

Klann K, Bojkova D, Tascher G, Ciesek S, Münch C, Cinatl J. Growth Factor Receptor Signaling Inhibition Prevents SARS-CoV-2 Replication. *Mol Cell*. 2020 Oct 1;80(1):164-174.e4. doi: 10.1016/j.molcel.2020.08.006.

Malasková V, Libánský J, Cinátl J. Some cytochemical reactions in the cells of long-term cultures derived from the blood of leukemic patients. *Neoplasma*. 1979;26(5):515-20.

Michaelis M, Wass MN, Cinatl J. Drug-adapted cancer cell lines as preclinical models of acquired resistance. *Cancer Drug Resist*. 2019 Sep 19;2(3):447-456. doi: 10.20517/cdr.2019.005.

Michalová K, Málková J, Cinátl J, Placerová J. Chromosomal characteristics and non-random distribution of sister chromatid exchanges in lymphoblastoid cell lines isolated from acute leukemias. *Neoplasma*. 1977;24(5):537-45.

Necas E, Cinátl J. Enhanced triggering of stem cell proliferation after two doses of hydroxyurea. *Cell Tissue Kinet*. 1982 May;15(3):269-73.

Ponka P, Cinátl J, Neuwirt J, Necas E. A contribution to the technique of mouse bone marrow cell culture in semisolid agar. *Folia Biol (Praha)*. 1978;24(1):68-77.

Soyfer VN. The consequences of political dictatorship for Russian science. *Nat Rev Genet.* 2001 Sep;2(9):723-9. doi: 10.1038/35088598.

Stöckbauer P, Cinátl J, Mach O. Establishment and characterization of permanent cell lines from patients with acute and hairy cell leukemia. *Neoplasma.* 1981;28(4):385-95.

Thomas A, Reetz S, Stenzel P, Tagscherer K, Roth W, Schindeldecker M, Michaelis M, Rothweiler F, Cinatl J Jr, Cinatl J, Dotzauer R, Vakhrusheva O, Albersen M, Macher-Goeppinger S, Haferkamp A, Juengel E, Neisius A, Tsaur I. Assessment of PI3K/mTOR/AKT Pathway Elements to Serve as Biomarkers and Therapeutic Targets in Penile Cancer. *Cancers (Basel).* 2021 May 12;13(10):2323. doi: 10.3390/cancers13102323.

Thomas A, Slade KS, Blaheta RA, Markowitsch SD, Stenzel P, Tagscherer KE, Roth W, Schindeldecker M, Michaelis M, Rothweiler F, Cinatl J, Dotzauer R, Vakhrusheva O, Albersen M, Haferkamp A, Juengel E, Cinatl J Jr, Tsaur I. Value of c-MET and Associated Signaling Elements for Predicting Outcomes and Targeted Therapy in Penile Cancer. *Cancers (Basel).* 2022 Mar 25;14(7):1683. doi: 10.3390/cancers14071683.

Winkelmann R, Bankov K, Döring C, Cinatl J, Grothe S, Rothweiler F, Michaelis M, Schmitt C, Wild PJ, Demes M, Cinatl J Jr, Vallo S. Increased HRD score in cisplatin resistant penile cancer cells. *BMC Cancer.* 2022 Dec 23;22(1):1352. doi: 10.1186/s12885-022-10432-7.