

Who was who in Jáchymov mineralogy II

Kdo byl kdo (II)? – Osobnosti, které přispěly k poznání mineralogie Jáchymova

(21 figs, 1 tab.)

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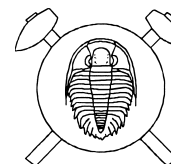
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The paper presents biographic data of persons, after whom new primary minerals discovered at Jáchymov were named (K. Sternberg, W. H. Miller, G. A. Krutov), as well as the recently discovered secondary minerals (J. Vajdák, J. Čejka, J. Švenek). Biographies of scientists who described new minerals from Jáchymov are given in the following part (F. E. Brückmann, I. Born, A. G. Werner, H. Dauber, G. A. Kenngott, W. Sartorius v. Waltershausen, F. Sandberger, R. Nováček, R. A. Vinogradova). Biographies of persons who significantly contributed to mineralogy of the Jáchymov ore district are presented in the last section (F. Babánek, J. Štěp, R. Zückert, R. P. Dubinkina, R. V. Geceva, F. Mrňa, M. Komárek, D. Pavlů). This contribution is a continuation of the 1997 article *Who was who? – In names of secondary minerals discovered in Jáchymov* [561] dealing exclusively with secondary minerals.

Kew words: Jáchymov, biographies of scientists, mineralogists, names of mineral species



Introduction

This contribution presents historical information concerning the discovery of primary minerals first described from Jáchymov (*uraninite*, *sternbergite*, *millerite*, *argentopyrite*, *krutovite*) and biographic information about those after whom the minerals were named. Biographic data on personalities honoured in names of newly defined secondary mineral species approved after 1997 (*čejkaite*, *švenekite*, *vajdakite*) are also included. In addition, the contribution also presents brief biographic information about mineralogists who described new minerals from Jáchymov (H. Dauber, G. A. Kenngott, W. Sartorius, F. Sandberger, R. Nováček, R. A. Vinogradova) or significantly contributed to the knowledge of mineralogy of the Jáchymov deposit. However, very little information has been found about several mineralogists (E. Turner, H. Dauber, R. Zückert and others). Mineral names and biographic data are presented in chronological order.

This historical contribution is a continuation of a similar one published in 1997 [561] and dealing with secondary minerals in Jáchymov.

Persons after whom new minerals discovered at Jáchymov are named

Kaspar Maria count Sternberg (1761–1838)

In 1826, W. Haidinger described the mineral *sternbergite* on samples from Jáchymov, coming from the collection of count Sternberg [491].

K. Sternberg was born on 6th January 1761 as the youngest of eight children of the Secret Councillor Johann Sternberg and Anna Josefa born Kolowrat-Krakowská. He was educated at home till the age of eighteen. After public examination at the Charles University in Prague, he travelled to Rome to study theology (1879–1882). He stayed the following years at the estate of his father at a small town of Radnice. In 1885, he was appointed a canon in Regensburg, and held higher posts in the church later. During these years, he was dealing with botany and, later on, with phytopalaeontology. In 1806, he applied for exemption from theological service. He remained in Regensburg in the position of a director of scientific institutions until 1810, when he returned to the

Table 1. Minerals for which Jáchymov is the type locality.

Uraninite	F. E. Brückmann (1727)	Schröckingerite	A. Schrauf* (1873)
Torbernite	I. Born (1772), A. G. Werner (1793)	Mixite	A. Schrauf* (1879)
Sternbergite	W. Haidinger* (1827)	Uranophane-beta	R. Nováček (1935)
Haidingerite	E. Turner (1827)	Metauranopilite	R. Nováček (1935)
Johannite	W. Haidinger* (1830)	Brassite	F. Fontan et al. (1973)
Millerite	W. Haidinger* (1845)	Nickel-zippeite	C. Frondel (1976)
Zippeite	W. Haidinger* (1845)	Krutovite	R. A. Vinogradova (1976)
Voglite	W. Haidinger* (1853)	Albrechtschraufite	K. Mereiter (1984)
Lindackerite	J. F. Vogl* (1853)	Jáchymovite	J. Čejka et al. (1996)
Uranopilite	H. Dauber (1854)	Vajdakite	P. Ondruš et al. (2002)
Acanthite	A. G. Kenngott (1855)	Čejkaite	P. Ondruš et al. (2003)
Argentopyrite	W. Sartorius von Waltershausen (1866)	Švenekite	P. Ondruš et al. (2003)
Isoclasite	F. Sandberger (1870)	Pseudojohannite	P. Ondruš et al. (2003)

* biography was already mentioned in: *Who was who? – In names of secondary minerals discovered in Jáchymov* [561]

family estate at Radnice in western Bohemia. Here, he founded a botanical garden, a library, and extended his collections brought from Regensburg. His main topic of interest, phytopalaeontology, was supported by finds from the coal mines at his estate. Count Sternberg headed a group of scientifically oriented people who proposed to found the Museum of the Kingdom of Bohemia in 1818. The idea was materialized four years later. Count Sternberg headed the museum until the end of his life and donated his library and all his collections to this institution. He died on 20th December 1838, at the Březina castle near Radnice [272].



Fig. 1. K. M. Sternberg [599].

William Hallowers Miller (1801–1880)

In 1845, Haidinger mentioned the occurrence of *millerite* at Jáchymov with the description of *millerite* as a mineral species [357]. For this reason, Jáchymov is considered the type locality for *millerite*.

W. H. Miller was born on 6th April 1801 in Llandovery, Carmathenshire, Wales. He graduated at Cambridge in 1826. With the support of his teacher, philosopher and mineralogist William Whewell (25th May 1794–6th March 1866), Miller was appointed a professor at the prestigious Cambridge University in 1832, a post, which he held for 42 years. Miller's specialization was crystallography and physics, in particular hydrodynamics. He developed the original idea of Whewell on the use of symbols for crystal faces, later known as

Miller's indices. Another important contribution was placing crystallography on mathematical basis. Miller studied crystal morphology of as yet unknown nickel sulphide, which was named *millerite* in his honour by Haidinger in 1845. In 1852, he described a new mineral named *whewellite* in honour of his teacher. W. H. Miller was a member of the Royal Society of London since 1838, its foreign secretary since 1856, a member of the Academy of Sciences in Paris and other scientific societies, Dr. h. c. at Oxford University and the University in Dublin. He died in Cambridge on 20th May 1880 [272], [566], [567], [596], [597].

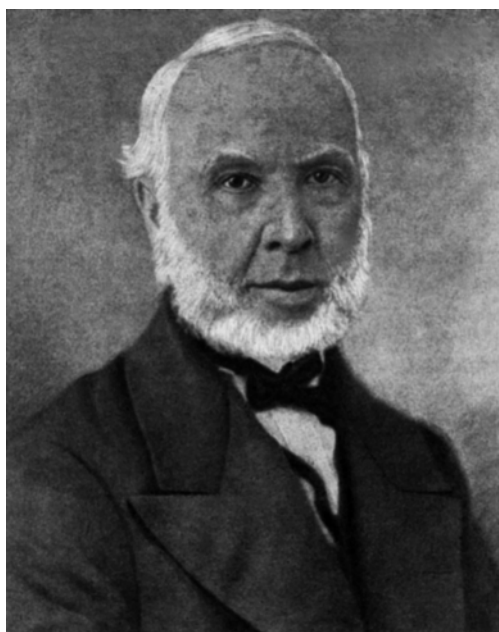


Fig. 2. W. H. Miller [567].

Georgiy Alekseevich Krutov (1902–1989)

Vinogradova et al. [181] described *krutovite* as a new mineral from Jáchymov.

G. A. Krutov was born 24th April 1902 in a small ancient Russian town Yuriev-Polskii in Vladimirsk gubernia (near Moscow, Russia), in a large family of a forester. After completing a school in Moscow in 1919 he worked eight years in forestry in the Vladimir and Moscow regions. In 1931 he graduated at the Geology and Prospecting Faculty of the Moscow Mining Academy (named Moscow Geological Institute since 1930).

In the period of 1933–1952, he worked as a senior prospecting geologist and coordinator in several prospecting programs: Co in Dashkesan deposit, Little Caucasus (now in Azerbaijan), Ni in silicate ores in ultrabasic massifs of Southern Ural, Co–Ni deposits in Ural, Kazakhstan, Chovu-Aksi in Tuva, and Cu–Ni(Co) deposits

Norilsk in the Krasnoyarsk region and Monchegorsk in Karelia. He also studied deposits in China, Korea, Bulgaria, and Czechoslovakia. In 1959 he published in Moscow a monograph *Ore deposits of cobalt*, including references to older literature on Co–Ni ores in Krušné hory Mts. (Erzgebirge).

During the period of 1956–1969, he studied iron deposits in the Little Caucasus, in the Krasnoyarsk region and in Buryatia. Basing on Cl contents in amphiboles, scapolite, and apatite in these deposits, G. A. Krutov formulated a hypothesis on the role of chlorine in the formation of contact-metasomatic deposits, which was later confirmed by experimental works. In the period of 1968–1970, he served as an expert in Morocco and formulated prognoses at the hidden deposits of Co–Ni ores Bou-Azzer.

G. A. Krutov was involved in pedagogic activity at universities for over 50 years. He was professor at the Mineralogy Department, Geology Institute of the Lomonosov Moscow State University.

G. A. Krutov died in Moscow on 11th December 1989 [600].

[This information is based on a personal communication (2004) by R. A. Vinogradova.]

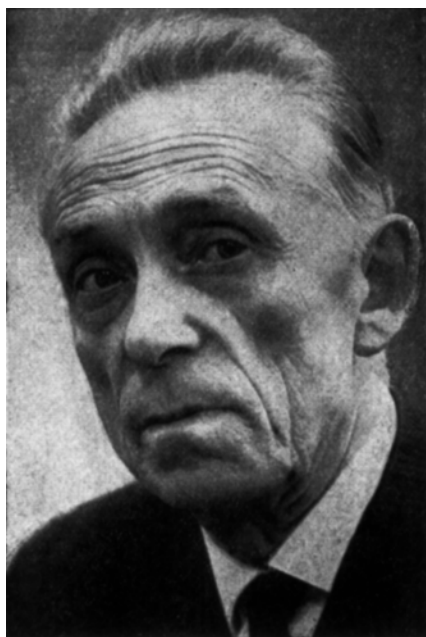


Fig. 3. G. A. Krutov.

Josef Vajdák (born 1930)

In 2002, Ondruš et al. [472] described a new mineral named *vajdakite* in honour of the mineralogist J. Vajdák, who drew the attention of authors to this species. J. Vajdák significantly contributed to mineralogical research of the Jáchymov ore district.

He was born on 31st March 1930 in Helena, Montana, USA, where his Czech parents lived temporarily. His father worked there for the Bata company as one of the partners who founded the company. In 1932, they returned to Zlín, Czechoslovakia, where J. Vajdák attended the primary and secondary school and studied at the Bata Academy for Foreign Trade in the period of 1945–1949. At the same time, on the wish of his father, he studied at the Maritime Academy for Navigation and Trade in Sopoty, Poland, where he obtained his first Captain licence in 1952. He worked in maritime transportation for several years. In 1960, he went to work in the office of Čechof-racht in Istanbul (Turkey). From this place, he emigrated with his family to the United States in 1962. In New York, he founded his own American Sea Tramping Company, dealing with maritime transportation.

Since early school years, his interest was attracted to chemistry, in particular to explosives and mineralogy. This later resulted in his study at the School of Mines at the University of Montana, Butte (Montana, USA), where he obtained his Ph.D. in mineralogy in 1974. For economic reasons, he returned to New York, where he founded the Zlín Anchor Company, providing charter shipments for major US companies in chemical and mining industry. In the early 1980s, he stopped the shipment enterprising in view of declining exports.

Later he decided to take up mineralogy on a commercial basis and founded the Pequa Rare Minerals company, which is in operation until now.

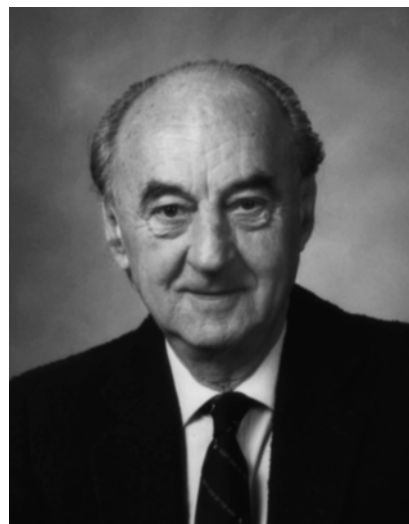


Fig. 4. J. Vajdák.

Jiří Čejka (born 1929)

In 2002, Ondruš et al. [473] described a new mineral named *čejkaite* in honour of J. Čejka for his notable contributions to the crystal chemistry of uranium minerals.

Jiří Čejka was born on 2nd September 1929 in Roudnice nad Labem, Czechoslovakia. After completing grammar school, he started to study at the Institute of Chemical Technology in Prague in 1948. During his studies, he was sentenced to 8 months imprisonment for his activities in the Scout movement in 1951 and excluded from the study. He served his sentence as a miner in the Kohinoor coal mine at Libkovice. After returning from military service in 1954, he started to work in the research laboratory of the Reagencia factory at Kralupy nad Vltavou, dealing with inorganic synthesis mainly of uranium compounds. By that time, he had to give up his dream about research in antibiotics and synthetic medicines. Only in 1958, he was allowed to continue external university studies and graduated from the Institute of Chemical Technology in 1961. From 1959, he worked in Glazura factory at Roudnice nad Labem dealing with preparation of precious metal compounds and later with the research of ceramic and enamel pigments. In 1972, he started to work in the research chemical laboratory affiliated to the National Museum in Prague. After 1989, he achieved judiciary rehabilitation of his sentence from the fifties. From 1991, he worked as the director of the Museum of Natural History of the National Museum, Prague. Uranium compounds and their natural analogues were the main topic of his research – a field in which he gained international recognition. J. Čejka got married in 1958 and has two sons.

It is interesting to note that while the authors searched for chemicals for a synthesis of the mineral later named *čejkaite*, they found a vial without commercial label in the laboratory of the Czech Geological Survey, containing exactly the compound they planned to synthesize – triclinic $\text{Na}_4\text{UO}_2(\text{CO}_3)_3$. Only some time later, they found that the compound was synthesized by J. Čejka in 1955, during his work in the Reagencia enterprise.



Fig. 5. J. Čejka.

Jaroslav Švenek (1927–1994)

In 1997, Ondruš et al. [476] described an unnamed phase, which was later defined as a new mineral *švenekite*. The name is in honour of J. Švenek for his professional and human qualities.

Jaroslav Švenek was born on 30th April 1927 in Klenová near Klatovy, Czechoslovakia as a second son of a school headmaster. His father died when J. Švenek was 6 years old. He studied a grammar school in Klatovy in 1938–1946. To fulfil the wish of his mother, he started to study economy, but after the first term he quit the school and enrolled for the study at the Faculty of Science, Charles University in Prague, for external studies at first, and for regular studies in 1948. After graduating from the university and closely before the graduation ceremony, he was arrested and charged with espionage. The proposed death penalty was changed to 25 years imprisonment. He started the program of forced labour at the Nikolaj shaft camp at Jáchymov and, from 1953, at another location of uranium mining – Bytíz near Příbram. He was released after the amnesty of May 1960 and started manual work followed by 5 month of compensation military service. Owing to Dr. K. Tuček, he was employed with the National Museum in Prague. His “delayed” graduation ceremony took place in 1965 and he got married in the same year. In the National Museum, he was dealing with ore deposits and their mineralogy, physical chemistry, and developed wide contacts with museums abroad. He devoted his time and energy to popularization of mineralogy among the young generation and to consultations with mineral collectors. J. Švenek died on 19th February 1994.



Fig. 6. J. Švenek [598].

Authors who described new mineral species from Jáchymov

Franz Ernest Brückmann (1697–1753 or 1754)

Born on 27th September 1697 in Marienthal near Helmstädt, Brückmann was active as medical doctor at Helmstädt, and later at Wolfenbüttel and Braunschweig, Lower Saxony, Germany. He developed wide interest in science and wrote papers on mineralogy, mining and other subjects. He visited various mining districts in Germany and in the Habsburg Monarchy. In 1724, he visited Slovakia and studied mineralogy and mining conditions at Banská Štiavnica in detail. In 1727–1730, he published an extensive work in two volumes *Magnalia Dei In Locis Subterraneis* at Braunschweig, recording his knowledge of mines in European countries, with numerous illustrations of minerals, mines and water-pumping equipments. The available literature does not provide clear evidence whether he visited Jáchymov, but the first volume of *Magnalia etc.* gives description of minerals from Jáchymov [494] and one of them is a mineral, later named *uraninite* by Haidinger [357]; the second volume is dealing mainly with the Jáchymov mines.

From Slovakia, Brückmann described ores and minerals from Banská Štiavnica, Kremnica, Špania Dolina, Dobšiná, Nižná Slaná, Gelnica, Solivar near Prešov, a.o. This work is considered the first attempt at topographic mineralogy and mining history of Slovakia, Sweden and other countries. He published 30 papers on minerals and mineral deposits in Slovakia.



Fig. 7. F. E. Brückmann [494].

Although Brückmann observed only visible external features of minerals, his publications are highly appreciated for systematic field observations and critical evaluation of older data. He also published papers on fossils, particularly those from the Habsburg Monarchy including Slovakia and Transylvania. Brückmann's private collection of about 1000 specimens included minerals and fossils, among other items. In 1749, he published a catalogue of the monastery museum at Wolfenbüttel, with descriptions of minerals, fossils, antiquity objects and curiosities. He was a member of the Prussian Royal Learned Society in Berlin and the Academia Caesarea Naturae Curiosorum academy in Vienna. Brückmann died on 21st March 1753 or 1754 [217], [602].

Ignaz Anton Edler von Born (1742–1791)

In 1772, Born described a mineral *mica viridis cristallina* from Jáchymov, later named *torbernite*. I. Born was born on 26th December 1742 in a mining town of Capnic in northern Transylvania (now northern Romania) in a family of Catholic immigrants from Saxony (he did not belong to descendants of Saxon colonists who settled in Transylvania in the 12th century). His father Ludwig Born served as an officer with artillery in the fortress of Karlsburg. He owned productive silver mines at Csertes and discovered the gold deposit of Nagyag, now Săcărâmb, in central Romania. Returns from property inherited from his parents helped I. Born significantly in later years.

He attended grammar school in Sibini (Hermannstadt) and later a Latin school and the Jesuit college in Vienna. In 1759, he enrolled with the Jesuit order, but left the order after 16 months. He came to Prague to study law in 1760. After graduation in August 1763, he studied science, mineralogy and mining at the Charles University in Prague in 1763–1766, with the support of J. T. Peithner von Lichtenfels (1727–1792). After graduation, he set out on a study journey through countries of western Europe. In his words, Born, though of Saxon-Romanian descent, considered Bohemia as his homeland.

In summer 1770, the empress Maria Theresa sent Born on a study journey to mining districts of Slovakia, Hungary and Romania. However, the travel was abruptly terminated as he got into ailment by inhaling arsenic fumes at the mine of Nagybanya (Baia Sprie) or Felsöbanya, probably in connection with the use of fire in underground works [227], [569]. Born suffered from arsenic intoxication for the rest of his life. Letters from his travels, containing detailed descriptions of ore deposits and ore veins, which he used to send to his friend Johann Jacob Ferber (1743–1790), were published by this Swedish mineralogist as a book in 1774. Born acquired considerable international reputation. By that time, he was a moderate neptunist but he partly influenced even the leading neptunist, A. G. Werner.

After returning to Prague in September 1770, he was appointed an assessor in the Imperial Mining and Mint-

ing Office in Prague. His field included mining problems in the scope of the Mining Office at Jáchymov – an opportunity which Born used to expand his renowned mineral collection. The collection kept in his residence in Prague-Malá Strana was considered a remarkable topic in the town. He tried to create an organisational base for scientific work, lacking in the Czech community in Prague. By his initiative and with the support of count František Josef Kinský, the *Czech Private Society* was founded in 1773 or 1774 and started to publish an educational weekly journal. In 1784, this society was transformed into the *Royal Czech Society of Sciences*.

He resigned from his function in the Imperial Mining and Minting Office in autumn 1772. Health problems were given as the reason for resignation, however, strict control on publishing mining and metallurgy data by personnel of the office was probably an important factor [570]. Born stayed at his estate in Staré Sedliště near Tachov, western Bohemia, the next four years, where he kept his mineral collection, library and a botanical garden. The collection included 3592 mineral specimens, 288 rock samples and 714 fossils. His rich collections were sold to Great Britain for the sum of 1 000 £ in 1775. In 1810, the collection was acquired by the British Museum in London.

During his stay at Staré Sedliště, Born's friend Ferber, using his experience from travels in Italy, convinced Born about the validity of theory, ascribing a major role in formation of rocks to "underground fire". Born published in Prague in 1773 the results of the study by F. J. Kinský from the Komorní Hůrka Hill (Kammerberg) near Cheb, describing the object as an extinct volcano.

After returning to Prague in 1776, Born was invited by the empress to Vienna to arrange and describe the Imperial nature science collections. Here, he worked with Karl Haidinger (1756–1797) and Abbé X. Stütz as junior staff members. A catalogue of the collection was published in 1778. In appreciation of his services, Born was appointed the Councillor in the Imperial Chamber for Minting and Mining in 1779.

Born also developed interest in chemical science and he furnished private chemical laboratories in the castle of Staré Sedliště and in Vienna. He is credited with the introduction of new amalgamation methods of separating gold from ores, which he demonstrated at the meeting of mining specialists from Europe and Mexico in Sklené Teplice near Banská Štiavnica, Slovakia, in 1786.

In the catalogues of his own collection and the collection of Eleonor von Raab, he described numerous mineral and rock specimens from Jáchymov. A later study of the catalogues allowed recognition of 41 mineral species from the Jáchymov district. Born gave the first description of *lepidolite* from Rožná in western Moravia. He also provided the first scientific description of *uraninite*, after the early brief note on this mineral by F. E. Brückmann in 1727 [494].

In recognition of his exceptional achievements, Born was awarded honorary membership of academic societies in many countries (France, Italy, Germany, Russia, Sweden, a.o.) as well as the Royal Society of London. Born died in Vienna on 24th July 1791. He was a leading personality of the central European Enlightenment and was sometimes designated "Austrian Werner" [227], [517], [569], [596], [602], [603], [604].

W. Haidinger [170] named the mineral *bornite* in his honour, noting that his father K. Haidinger recognized the mineral as a mineral species while he worked under Born's guidance.



Fig. 8. I. A. Edl. von Born [602].

Abraham Gottlob Werner (1750–1817)

He was born on 20th or 25th September 1749 in Wehrau (Upper Lusatia in Saxony), now Osiecznica in SW Poland. His family had an old mining tradition and his father was an inspector of iron works. After some practice of a copying clerk in his father's enterprise, A. G. Werner studied mining and metallurgy at the Mining Academy in Freiberg in 1769–1771 and later law and sciences in Leipzig. After graduation, he held a position at the Mining Academy in Freiberg for the rest of his life. In 1775, he was appointed an inspector and later on professor, lecturing mining, mineralogy and geology (then called geognosy). Werner, as an outstanding lecturer, taught numerous students from various countries and was very popular among students. In his lectures and textbooks, he separated geology from mineralogy and gave foundations to new branches – stratigraphy, palaeontology and geology of ore deposits. Werner emphasized the importance of observations in nature, as opposed to spec-

ulative approaches, common in that time. On the basis of Swedish neptunist scholars J. G. Wallerius and T. O. Bergman, he formulated the neptunist theory in a small work *Kurze Klassifikation und Beschreibung der verschiedenen Gebürsarten* in 1786–1787, suggesting that all rock types were deposited in a primary ocean having a different character of water than the present ocean. In 1791, Werner expanded the neptunist theory to include the formation of ore veins. Jáchymov mines played a crucial role in this theory as the mines exposed steep dyke-like bodies designated *Buckenwacke* or *Putzenwacke* (“particulated greywacke”), containing fragments of fossilized wood. The first discovery of fossil wood was in the Eliáš mine in 1556 at a depth of 268 m, followed by later finds at a depth of 360 m. F. Becke (1912) described fragments of yew-tree and oak from the depth of 260 m [571]. Werner explained *Buckenwacke* as fracture-filling (descendent) sediments. In reality, the rocks correspond to basaltic tuff or volcanic breccia connected with the Tertiary alkali basaltic volcanism and have no relation to ore veins. The Werner’s neptunist theory fitted the knowledge of a researcher from the central and northern Europe, who had no experience with active volcanism.

Shortly after 1788, former Werner’s pupil J. C. W. Voigt disputed the neptunist theory. Voigt studied Tertiary basalts of Thuringia and Rhön and explained their formation by volcanism, thus starting a lengthy dispute between neptunists and vulcanists. Gradually, some other pupils of Werner, such as Lepold von Buch and Alexander von Humboldt, who travelled through the volcanic regions of Italy, turned to vulcanists. The dispute was widely publicized and found its way also into art. A friend of Werner, J. W. Goethe (1749–1832), mentioned the dispute in his monumental work *Faust* as a generally known topic.

In connection with the neptunist theory, Werner studied sequences of sedimentary rocks. He built on the work of J. G. Lehmann and G. Ch. Füchsel from the 1750s and 1760s, and defined four main formations based on their petrographic characteristics: *Urgebirge*, *Übergangsgebirge*, *Flözgebirge* and *Aufgeschwemmten Gebirge*. He anticipated a later division of beds, depending on the time of their formation, to stratigraphic units. In 1798, students from the Mining Academy commenced the first systematic geological mapping of Saxony under Werner’s guidance. In this context, colour explanation columns, similar to those used in modern maps (i.e., red – granites, green – amphibole rocks, etc.), were introduced.

As mineralogist, Werner proposed systematics based on external features of minerals in 1774. As an alternative to the nomenclature of K. Linné, he proposed a single-word, artificial nomenclature of minerals and first proposed the use of surnames of persons as mineral names. He has the priority in the description and introduction of names for numerous minerals, e.g., *anhydrite*, *apatite*, *graphite*, *olivine*, *prehnite*, *rutile*, *torbernite*, *witherite*, *zircon*, a.o. Werner collected specimens. His collection sold to the Mining Academy in Freiberg in 1814 amounted at 10 000 samples of minerals, rocks and fossils.

Werner was active also in the mining administration in Saxony. He was a member of the Supreme Mining Office (*Oberbergamt*) in Freiberg from 1792 and the Saxon Royal mining counsellor from 1799. A. G. Werner died in Dresden on 30th June 1817. He occupies a prominent position among personalities of geological sciences, as he founded the Freiberg school, influential in the late 18th century and through the whole of 19th century. Werner Societies were active in various countries, e.g., Werner Verein in Moravia (1851–1865).

On the occasion of the 100th anniversary of Werner’s birth, the Rudolf shaft in Jáchymov was named the Werner shaft in 1850 (today, the Rovnost shaft) [217], [272], [605], [606], [607], [608].

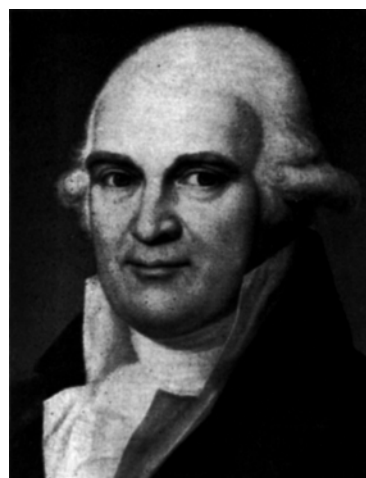


Fig. 9. A. G. Werner [217].

H. Dauber

H. Dauber gave the first description of *uranopilite* from Jáchymov under the name *basisches Uransulfat* in 1854 [171]. He worked as an assistant in the Imperial Mineralogical Cabinet in Vienna. H. Dauber died on 12th March 1861.

Gustav Adolf Kenngott (1818–1897)

G. A. Kenngott described a new mineral *acanthite* in the material from Jáchymov in 1855 [221].

Kenngott was born in 1818 in Breslau (now Wrocław in SW Poland), where he also studied and was appointed Private Assistant Professor of mineralogy, crystallography and geognosy at the university in 1844. From 1850, he worked for *K. k. geologische Reichsanstalt* in Vienna and simultaneously taught at a secondary school in Bratislava. In the years 1852–1856, he worked as an assistant to P. Partsch in the Imperial Mineralogical Cabinet in Vienna. He obtained the position of a professor at Polytechnics (later ETH) in Zürich in 1856 and simultaneously at the University in Zürich in 1857. In 1872, Kenngott was appointed the director of joint mineralogical, geological

and palaeontological collections of both these institutions in Zürich. He published a number of textbooks and manuals dealing with crystallography, mineralogy and petrography, and published topographic mineralogy of Switzerland in 1866. Kenngott described a number of new mineral species, among others *enstatite* and *hemimorphite*. He retired in 1894 and died on 3rd March 1897 in Lugano, canton Tessin, Switzerland, or in Zürich [245], [272], [360] [573].



Fig. 10. G. A. Kenngott.

Wolfgang Sartorius Freiherr von Waltershausen **(1809–1876)**

W. Sartorius described a new mineral *argentopyrite* from Jáchymov in 1866 [529].

He was born on December 17, 1809 in Göttingen, central Germany. His father was a prominent historian, professor Georg Sartorius Freiherr von Waltershausen (1765–1828). Wolfgang Sartorius got his first name after his godfather Johann Wolfgang Goethe who kept friendly relations with the family. W. Sartorius studied sciences at the Göttingen University and was tied with this university through his whole life. He was appointed the professor of mineralogy and geology at the University of Göttingen (1847–1876). During the years 1834–1837, he ventured onto his first study trip to Italy and Sicily. Later on, W. Sartorius visited Sicily and the Etna volcano several times, and conducted topographic and geological mapping and volcanologic research here. He published the *Atlas des Atna* in eight volumes in the years 1845–1861. He also undertook research trips to Iceland

and published the *Geological Atlas of Iceland* in 1853. Other trips led W. Sartorius to France, England, Alpine countries, Scandinavia and Russia.

He was elected regular member of the Göttingen Academy of Science in 1856. In 1859, after the death of the professor of technology, mining and mineralogy Ludwig J. F. Hausmann (1782–1859), he was in charge of reorganization and moving of the mineral collection from the Academical Museum into the building of the Academy laboratories founded by J. F. Gmelin (1748–1804) at the turn of 18th and 19th century. The collections were thus next to the chemical laboratory headed by Friedrich Wöhler (1800–1882), where W. Sartorius – under Wöhler's guidance – analysed volcanic rocks collected with Robert Wilhelm Bunsen (1811–1899) during joint trips around Europe and to Iceland. W. Sartorius discovered that plagioclase compositions represent mixtures of *albite* and *anorthite* components. From the fifties, he also studied mineral composition of rocks in thin sections with a polarizing microscope. In addition to volcanology and petrography of magmatic rocks, he was interested in tectonics, glaciology and palaeoclimatology. W. Sartorius is considered to be the founder of scientific volcanology.

W. Sartorius was a close friend of much older Carl Friedrich Gauss (1777–1855), who was his colleague at the university. After Gauss' death, he wrote his first biography [574]. W. Sartorius retired in 1875 and died on 16th October 1876 [572], [596].



Fig. 11. W. Sartorius von Waltershausen [574].

Carl Ludwig Fridolin von Sandberger (1826–1898)

F. Sandberger described a new mineral *isoclasite* from Jáchymov in 1870 [212].

He was born on November 22, 1826 in Dillenburg, Hesse region, Germany. He studied in Bonn, Giessen, Heidelberg and Marburg. Later he was appointed the director of the Land Museum for Nature Science in Wiesbaden. In collaboration with his brother Guido, museum inspector in Wiesbaden, he conducted palaeontological research in the Devonian of the *Rheinische Schiefergebirge* in Nassau. Between 1849–1856, the two brothers described the first finds of microfossils (ostracodes). Sandberger became the professor of mineralogy and geology at Polytechnics in Karlsruhe in 1855. In 1856, he organized systematic geological mapping of Baden at the scale of 1 : 50,000, conducted by private scientists with government support, and prepared three map sheets himself. In 1863, F. Sandberger moved to the Würzburg University in NW Bavaria as the professor of mineralogy and geology and the curator of the University's mineral collection. By the turn of the century, the collection gathered by Joseph Bonavita Blank (1740–1827) was the largest private mineral collection in Germany, including 28,000 specimens.

In Würzburg, F. Sandberger studied stratigraphy and palaeontology in the wider environs of Würzburg and freshwater Tertiary molluscs. In 1870, he described two new minerals – *isoclasite* and *collophane* – on specimens in the Blank's collection. Collophane was later recognized as microcrystalline *apatite*. *Isoclasite* was described using a single specimen from Jáchymov. The specimen was later lost, which resulted in doubts concerning the validity of *isoclasite* as a mineral species.

In 1877, F. Sandberger surprised scientific circles by turning attention to geology of ore deposits. In his paper *On the theory of ore veins formation* he presented hypothesis of lateral secretion, suggesting that ore veins carry components released from silicates in the neighbouring rocks through the activity of low-temperature descending solutions. The Sandberger's views were criticized by defenders of hydrothermal ascendent hypothesis in ore veins formation, including Alfred Wilhelm Stelzner, professor of the Mining Academy in Freiberg (1879) and F. Pošepný, professor of Mining Academy in Příbram. In a short time, the hypothesis of lateral secretion was applied on numerous deposits of non-ferrous metals in USA, Australia and some Au and Ag deposits in Russia. Possible practical consequences of the hypothesis were realized by the administration in central authorities (of the Austrian Empire) in Vienna, as operations took place at depths exceeding 1000 m in the Příbram district, the main centre of Ag and Pb mining. In 1884, a commission was appointed with the aim to decide the dispute on the mode of formation of veins in the Příbram mining district. F. Sandberger and F. Pošepný took part in commission's work. In the commission, opin-

ions turned in favour of Sandberger's hypothesis, while opposing F. Pošepný was supported by chemist A. Patera, known by his activities at Jáchymov [561]. The dispute was later decided by A. W. Stelzner and his team in Freiberg (1889, 1896) who demonstrated that the metal content in wall rocks is linked with microscopic sulphide inclusions; other methodical shortcomings in Sandberger's publications were noted. Later on, the lateral secretion hypothesis was negated also for vein gold deposits. Around 1900, most mining geologists turned to mineralization by ascending solutions, as a viable interpretation.

F. Sandberger retired in 1896 and died in Würzburg on April 11, 1898 [272]. His name was nearly forgotten for a long time, but new data on element sources in endogenous metallogeny revived the interest in the hypothesis of lateral secretion and its author [609], [610].



Fig. 12. F. Sandberger.

Radim Nováček (1905–1942)

R. Nováček described *uranophane-beta* and *metauranopilite* from Jáchymov in 1935 [475]. To the honour of R. Nováček, C. Frondel named a new uranium mineral *nováčekite*.

Radim Nováček was born on 21st March 1905 in Ústí nad Orlicí in eastern Bohemia. His father was a lawyer and a local administrator. R. Nováček developed his interest in mineralogy during his study at a grammar school in Vysoké Mýto. Later, he studied sciences and chemistry at Charles University in Prague, specialized in mineralogy and was appointed the assistant of professor F. Slavík in the Mineralogy Institute. He habilitated in 1936 in mineralogy and worked in mineralogical institutions in Vienna and Graz (Austria). R. Nováček developed exceptional skills in quantitative chemical analysis of very small samples. In cooperation with professor F. Ulrich and Z. Trousil, he started to work on the application of X-ray diffraction. In recognition of his achievements, he was elected an extraordinary member of the Royal Czech Society of Sciences and external member of the State Geological Institute (Geological Survey of Czechoslovakia).

Following the closure of universities after Nazi occupation in 1939, R. Nováček worked for the National Museum, particularly in the chemical laboratory. In connection with his anti-Nazi activities, he was arrested in September 1941 and died in the concentration camp at Mauthausen near Linz, Austria on 13th February 1942 [573], [575], [576].



Fig. 13. R. Nováček [576].

Raisa Alexandrovna Vinogradova

In 1975, she described in collaboration with other mineralogists a new mineral *krutovite* from Jáchymov.

R. A. Vinogradova was born 28th August 1935 in Moscow, Russia, in family of a clerk of local administration. In 1958, she graduated at the Geological Institute of the Lomonosov Moscow State University as mineralogist. In 1969, she vindicated a PhD. thesis on mineralogy and genetic aspects of the Krasnokamenskaya group of iron deposits in the Eastern Sayan, Russia, under the leadership of Professor G. A. Krutov (1902–1989). Later on, R. A. Vinogradova specialized in study of minerals of Fe skarn deposits (Eastern Siberia and Caucasus), Mo–W skarn deposits (Tyrny-Auz and Northern Caucasus), and Ni–Co arsenide deposits (Khovu-Aksi in Russia, Czechoslovakia, and Bou-Azzer in Morocco).

In the period of 1958–1994, she was a lecturer at the Mineralogy Department of the Geology Institute of the Lomonosov Moscow State University. During the period of 1975–1985, she took part in a study of Co–Ni minerals from deposits in Czechoslovakia and Russia in the framework of a co-operation between the Lomonosov Moscow State University, Russia and the Charles University in Prague, Czechoslovakia.

In the period of 1992–1996, she served as an expert in Bou-Azzer deposit in Morocco where she studied mineralogy on new hidden deposits Eastern Bou-Azzer and Tamdrost. She took part in a discovery of a late Au–Se mineralization with occurrence of Co–Ni seleno-arsenides in 1995.

R. A. Vinogradova lives in Moscow, Russia.

[This information is based on a personal communication (2004) by R. A. Vinogradova].



Fig. 14. R. A. Vinogradova.

Outstanding mineralogists involved in the study of Jáchymov minerals

František Babánek (or Franz Babanek) (1836–1910)

He was born in Kamenný Přívoz near Jílové near Prague on 10th October 1836. After a short study at a grammar school and polytechnic school in Prague, he studied at the Mining and Forestry Academy in Banská Štiavnica for three years. He served as a mining engineer in Příbram mines from 1857, which exploited the most important deposit of silver and lead in central Europe of its time. In 1863–1864, F. Babánek served in the geological survey of the Austrian Empire (K. k. geologische Reichsanstalt, GRA) in Vienna together with F. Pošepný and other young mining engineers, with the aim to improve mining information in that institution. He also took part in geological mapping in Slovakia, north of Trenčín. W. Haidinger, director of the GRA, appointed F. Babánek a corresponding member of the institution. In the period of 1864–1881, he served as the head of mining administration of the Anna and Prokop shafts at Příbram. Besides standard service duties, F. Babánek studied mineralogy of the Příbram ore veins and, at the same time, mineralogy and mining history of gold deposits near Jílové. He was the main author of the publication *Silver and lead mining in Příbram* published on the occasion of reaching the depth of 1000 metres in the Vojtěch shaft at Příbram in 1875. In 1881, F. Babánek was appointed the head of mines and smelter administration at Jáchymov. He contributed to the continued operation of Jáchymov mines under economically adverse conditions and took interest in geology, mineralization and mining history of local mines. He published the first geological map of sections through the Jáchymov ore district in 1891. F. Babánek retired in 1901 with the title of Senior Mining Counsellor (*Oberbergrat*), spending most of his time in Pardubice and Prague-Karlín. F. Babánek died in Prague on 25th February, 1910. His son Karel Babánek (1872–1937) was known as a modernistic poet and writer by the turn of century [523], [531], [596], [611].



Fig. 15. F. Babánek (in the middle of the lowest row). The photo was taken in 1891 during a visit of archduke Ferdinand d' Este (successor to the throne) in mines of Příbram.

Josef Štěp (1863–1926)

He was born in Mokrý near Opočno in eastern Bohemia on 6th March 1863. He graduated in mining and geology from the Mining Academy in Příbram. In the period of 1889–1924, he served in Jáchymov, first as a mine geologist at the Werner Mine, and as the director of State mines and smelters at Jáchymov from 1908 and the head of the State Mining Office from 1918. Following the discovery of radium and its medical applications, J. Štěp was engaged in the research of radioactivity of the Jáchymov mine waters for applications in balneological and medical treatment. In 1904, he published a study on the occurrence of uranium ores at Jáchymov with F. Beck (*Das Vorkommen des Uranpecherzes zu St. Joachimsthal*) and also wrote



Fig. 16. J. Štěp.

popularisation articles. J. Štěp significantly contributed to the expansion of Jáchymov mines and local spas, and was awarded the title of a mining counsellor (*k. k. Bergrat*). He died in Příbram on 24th March 1926 [520], [523].

Richard Zückert

R. Zückert published an excellent study on 202 ore samples from Jáchymov in the journal of the Geological Institute in Berlin (*Geologische Landesanstalt*) in 1926. The paper was aimed at genetic relations among Co-Ni-arsenides, native *silver* and *bismuth* [423]. The preparation of polished sections and reflected-light microscopy was performed in the department of ore, rock and salt microscopy (*Abteilung für Erz-, Gesteins- und Salzmikroskopie*) of this institution. The interest in Jáchymov ores was in line with a general increase in interest in various types of ores of that time. As R. Zückert was never employed in the Institute [361], it is probable that he conducted this work externally, on an order. He did not publish another professional paper, which is surprising with regard to the high skills demonstrated in the study of Jáchymov ores. It is probable that R. Zückert held a post at the mineralogy department of a university, however, inquiries at numerous universities in Germany remained without result. It is probable that R. Zückert disappeared during World War II.

Raisa Pavlovna Dubinkina

She was born on 8th November 1919 in Moscow, Russia. She completed the Geological-Prospecting Institute in Moscow in 1943. In the period of 1943–1947, she worked in the Institute of Mineral Resources (VIMS) in Moscow.

With the start of the atomic project in the former Soviet Union, R. P. Dubinkina was involved in research of uranium deposits. In 1947–1951, she worked as a mineralogist, together with R. V. Geceva and other Russian specialists, in Jáchymov in a state enterprise Jáchymov uranium mines. She specialized in study of uranium ores, their mineralogical composition and genesis, not only at Jáchymov but also at other uranium occurrences and deposits of that time in Czechoslovakia, e. g., Boží Dar,

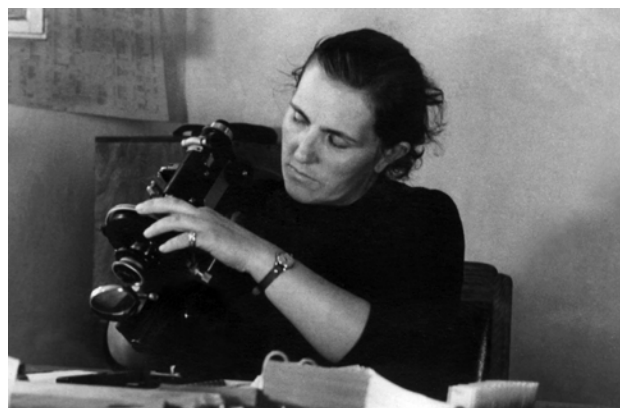


Fig. 17. R. P. Dubinkina.

Horní Slavkov, and Příbram. The results of her notable work were included in the confidential annual reports for the Jáchymov uranium mines. In addition to mineral descriptions and genetic relations of the minerals, the reports give accurate location for a large number of studied samples.

After returning from Czechoslovakia in 1951, R. P. Dubinkina lived and worked with her husband, mining engineer R. A. Grigoryan, in Ukraine at the iron industry centre Krivoy Rog. She studied mineralogy of the Pervomayskoe uranium deposit during its exploitation. Beside this, she took part in preparation of a monograph concerning geology of the Krivoy Rog deposit.

In the period of 1961–1970, she lived in the Shevchenko town at the Kaspic see. At present, R. P. Dubinkina lives in Moscow.

[This information is based on a personal communication (2004) by colleagues and friends of R. P. Dubinkina.]

Revekka Venediktovna Geceva (1910–1994)

R. V. Geceva was born 26th February 1910 in the Biten settlement, Grodneck gubernia, Belorussia. Her family moved to Moscow, Russia, in the early twenties of the last century. After an early death of her father (pharmacist), she had grown up in an orphanage. During the years 1928–1932, she studied at the Geology and Prospecting Faculty of the Moscow Mining Academy (named Moscow Geological–Prospecting Institute since 1930).

R. V. Geceva started her professional activity as a member of an Arctic polar expedition to Novaya Zemlya, where she studied base metal mineralization during 1932–1933. In the period of 1933–1946, she studied raw materials at VIMS (Institute for Mineral Resources) with specialisation in ore mineralogy and petrography. She also studied fluorite mineralization in the Gissar Mts. in Central Asia and the phlogopite deposit of Slyudyanka at the Baykal lake (Siberia). In 1944, she vindicated a PhD. thesis on mineralogy of manganese ores – an examiner was the well-known Russian mineralogist A. G. Betekhtin (1897–1962).

With the start of works on the atomic project in the former USSR, R. V. Geceva was involved to research of uranium raw materials. During the years 1946–1951, she worked in Jáchymov in a joint Soviet-Czechoslovak state enterprise Jáchymovské doly. She moved to Jáchymov with her husband Dr. Vl. V. Chernyshev and their 10 and 7 years old sons Igor and Leonid. Here she conducted a systematic mineralogical study of uranium ores of the Jáchymov deposit, jointly with R. P. Dubinkina.

The results of their notable work, based mainly on microscopy of polished sections, were included in confidential annual reports for the Jáchymov uranium mines. In addition to mineral descriptions and genetic relations of minerals, the reports gave accurate locations of a large number of studied samples. They identified a number of primary and secondary minerals new to the ore district. Some of the reported data were confirmed by the present study (e.g., *lautite*, *greenockite*, *kasolite*) and some were

re-defined (e.g., *gladite* to *aikinite* and *lindströmite*) [358], [424]. In 1949, their daughter Anna was born in nearby Karlovy Vary.

After returning from Jáchymov in 1951, she worked at VNIICHT (Chemical Technology Research Institute) in Moscow. At this position, she continued study of uranium ores from Thuringia (now Federal Republic of Germany) and Moravia in Czechoslovakia. Given the political situation in the former USSR and the secrecy imposed on uranium-related topics, R. V. Geceva could not publish detailed results of her research. In 1956, she published a monograph on uranium minerals, which was for some 15 years the single book dealing with uranium minerals and their diagnostic, accessible in countries of the eastern block. During later years, she studied the behaviour of uranium in processes of metamorphism. Results of work on the uranium-bearing black shales were published in a monograph in 1981. R. V. Geceva died in Moscow on 10th July 1994.



Fig. 18. R. V. Geceva.

František Mrňa (1928–1992)

He was born in Kamenné near Třebíč, Czechoslovakia on 7th March 1928 in a family of a small farmer. In the period of 1940–1943 he attended the secondary school at Budišov near Třebíč. The following three years he obtained training as a bricklayer. In 1947, he suffered a serious injury from electric current, followed by 9 months of hospital treatment. In the same year he passed exams at a grammar school for invalid students. He started his studies at the Faculty of Chemistry in Brno in 1948, followed by studies at the Leningrad University, USSR, in 1950–1955.

In 1955, F. Mrňa started his work for the Central Geological Institute in Prague (now Czech Geological Survey) where he was active till his retirement in 1990. He held the post of a scientific secretary of a Soviet adviser with the Government Committee for Geology in Prague in the years 1956–1957. In period of 1956–1961, he studied the ore mineralization in Jáchymov ore deposit. His professional specialization was geology of ore deposits and geochemistry; he earned the post-graduate title of



Fig. 19. F. Mrňa.

Doctor of Geological Sciences in 1976. He served as the deputy director of the Institute in the period of 1970–1978. F. Mrňa worked abroad for many years – as a mining geologist in Cuba (1962–1964), UNESCO specialist in Congo (Brazzaville) (1967–1970), Mali (1971–1972) and at the Constantin University of Algeria (1981–1986). He died on 5th August 1992.

Miroslav Komárek (1937–1970)

He was born in Prague on 11th August 1937. After completing a two-year training program for miners at Žacléř in 1954, M. Komárek studied at the geological technical secondary school in Prague-Žižkov. He was employed in the Central Geological Institute in Prague from July 1958, in the department for research of non-uranium ores at Jáchymov, headed by F. Mrňa. At the same time, he exter-



Fig. 20. M. Komárek.

nally studied mineralogy at the Faculty of Science, Charles University in Prague (1962–1968) and defended his diploma thesis *Mineralogy and petrography of greisens of the Blatno granite massif*, prepared under professional guidance of L. Žák and Z. Pácal. M. Komárek wrote several unpublished reports on mineralizations in the Jáchymov district, particularly on silver ores. He assembled an extensive mineral collection, considered as ranking among the top-quality private collections during the sixties in Czechoslovakia. After a crisis in his private life, M. Komárek committed suicide. He died on 28th February 1970.

(This contribution is based on personal communication with his former colleagues, the memory of the authors and personal data of the Czech Geological Survey.)

Dana Pavlů (born 1933)

D. Pavlů was born as Hajíčková in Liberec, Czechoslovakia on 19th July 1933. In 1938, after annexation of the Sudetes by Nazi Germany, her family moved to Prague.

In 1951, D. Pavlů passed her grammar school exams and started to study inorganic chemistry at the Institute of Chemical Technology in Prague, later on at the Faculty of Inorganic Technology headed by Professor J. Kašpar. She graduated in 1956 in the specialization of raw materials.

She started to work for the Central Geological Institute in Prague (now Czech Geological Survey) in 1956 and, together with F. Mrňa, began to study non-uraniferous ores in the Jáchymov ore district. This was also the topic of her post-graduation thesis. After the termination of the Jáchymov project, she participated in prospecting programs for Sn and W, feldspars and Li, mainly in western Bohemia. D. Pavlů retired in 1990.



Fig. 21. D. Pavlů.

Kdo byl kdo (II)? – Osobnosti, které přispěly k poznání mineralogie Jáchymova

V práci jsou popsány životopisy osob, po kterých byly nazvány jáchymovské primární minerály (K. Sternberg, W. H. Miller, G. A. Krutov) a nově popsané sekundární minerály (J. Vajdák, J. Čejka, J. Švenek). V další části jsou uvedeny životopisy lidí, kteří nové jáchymovské minerály popsali (F. E. Brückmann, I. Born, A. G. Werner, H. Dauber, G. A. Kennigott, W. Sartorius v. Waltershausen, F. Sandberger, R. Nováček, R. A. Vinogradova). V poslední části jsou životopisy lidí, kteří se v minulosti významně podíleli na rozvoji mineralogie jáchymovského ložiska (F. Babánek, J. Štěp, R. Zücker, R. P. Dubinkina, R. V. Geceva, F. Mrňa, M. Komárek, D. Pavlů). Článek navazuje na „Who was who“ [561].