

Jiří Kříž: a life dedicated to the Silurian world

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Jiří Kříž (March 31, 1943 – March 23, 2024), a major personality in the studies of Lower Palaeozoic rocks of the Barrandian area and Palaeozoic bivalves, passed away shortly before his 81st birthday. He was a world-renowned palaeontologist and stratigrapher, and also a leading Czech nature conservationist.

Jiří Kříž was born in Prague on March 31, 1943. He showed an early passion for palaeontology while attending elementary school in Strašnice, which was then a working-class suburb of Prague. His interest was sparked in 1953 at the age of ten when he discovered fossils and geological brochures in a trash can outside his school. This find led him to explore the geological landscape in and around Prague. Firstly, as a small boy, he participated on an excursion to the Prokop Valley and he liked to remember how he found his first bivalve shell: *“I made an amazing find. I chipped a perfect little shell out of the stone, completely white as if made of sugar, about the size of a crown coin. It had radial and transverse ribs on it – simply beautiful. I proudly showed it to field trip leader, and he exclaimed, ‘Well, that is a beautiful Silurian cockle – a Cardiola!’ He praised me and immediately started trying to coax it out of me. He said it was a rarity, and that it was not worth as much to me, that he would give it to someone who studies them and writes scientific papers about them, and asked if I would not mind giving it to him. But for me, it was a treasure, more valuable than a handful of diamonds. I declared that I wanted to keep it and that I would study them myself one day. I do not remember anything else from that trip, because the experience of such a great find was so overwhelming that I do not even remember how I got home to Strašnice by trolleybus. And I had no idea then that I would describe that very same shell as a new species of a new genus, Cardiolinka, exactly twenty-five years later...”*



Jiří Kříž is relaxing in the Černý lom (Black Quarry). Archive of J. Křížová.



The golden generation of Czech palaeontology. The photo was taken during the excursion (the Vltava River cruise was also included) to the 100th anniversary of the publication of Počta's guide Geological Excursions around Prague, year 1997. From the left, the captain of the boat, Vladimír Havlíček, Pavel Dufka, Michal Mergl, Radvan Horný, Jiří Kříž, Jaroslav Kraft, Petr Štorch, Ivo Chlupáč, Vojtěch Turek. Archive of J. Křížová.

Later, he particularly cherished his expeditions with Jaroslav Petrboř to the Kobyla quarry near Koněprusy. During these expeditions, he met other collectors including Josef Hedvičák, Jiří Šolc, and Josef Putzker. In 1957, Jiří enrolled in a secondary geological industrial school, and he encountered many young personalities in geology and palaeontology, including Radvan Horný, Vladimír Havlíček, Ivo Chlupáč, Rudolf Prokop, Pavel Röhlich, and Jiří Vaněk. Professor Bedřich Bouček significantly shaped Jiří's palaeontological path. Bouček advised him that studying trilobites was pointless as the field was already overcrowded, and he recommended studying Palaeozoic bivalves. This was because bivalves held stratigraphic significance and were still abundant today, making them a more promising area of research.

As early as 1959, Jiří published his first work on a temporary exposure of the Zahořany Formation in Strašnice. While still in secondary school, he published actively, contributing works on geological exposures in Prague (1960), moldavites from Vrábče (1961), a new abyss near Srbsko (1961), and research on Barrande's locality Butowitz (1961). In 1961, under the guidance of Radvan Horný, he mapped the Silurian in the vicinity of Jinonice and Řeporyje at a scale of 1: 5,000 as his graduation project at a secondary geological industrial school.

In 1961, Jiří Kříž began his geology studies at Charles University. During this time, he intensively collected bivalves in the Ordovician, Silurian, and Devonian of the Prague Basin. From his very first semester, he focused on revising the Silurian bivalve genus *Cardiola*. Interestingly, despite his focus, his initial systematic publication in 1962 was on trilobites, specifically evaluating new finds of the species *Phaetonellus dentatulus*. This was followed by works on geological mapping in the vicinity of Jinonice near Prague (1962) and detailed stratigraphy of the Ortocerový lůmek palaeontological site (1963). In 1964, he won third prize in a national competition for student scientific work for the initial results of his study on the genus *Cardiola*. That same year, he commenced work on his diploma thesis. This significant project involved a comprehensive evaluation of the morphology, palaeoecology, ontogeny, and phylogeny of the newly defined bivalve genus *Butovicella*. He published a preliminary report on this genus in 1965, a year before graduating. Upon successfully defending his diploma thesis, Jiří Kříž began his lifelong

career at the Central Geological Survey in Prague (now Czech Geological Survey). He initially joined as a geologist-technician, a position offered to him by Vladimír Havlíček. He left Prague for just one year in 1972 when he obtained a scholarship for a one-year stay at the Smithsonian Institution, a prestigious scientific institution in Washington D.C., USA. He considered this year in abroad to be a crucial for him: *“Staying in the USA allowed me to learn about new approaches to studying fossil fauna and new interdisciplinary fields like palaeoecology, functional morphology, and comparative anatomy. It also helped me improve my English. Looking back, I consider that year the most important for my future work and my life.”* After his return, he continued his research on Palaeozoic bivalves at the “Survey”. In 1977, he successfully defended his doctoral thesis, which focused on a detailed systematic study of the new superfamily Cardiolidae. This achievement led to his promotion to a regular research scientist position in Central Geological Survey in Prague.

In 1975, Jiří became the national leader of Project No. 53 Ecostratigraphy, a critical endeavor within UNESCO’s International Geological Correlation Programme (IGCP). His influence broadened in 1980 when he assumed the role of co-editor for *Lethaia*, the journal of the International Palaeontological Association. Commencing in 1984, Jiří Kříž was a voting member of the Silurian Stratigraphic Subcommittee, an organization then primarily composed of British geologists.

Within the scope of the Ecostratigraphy project, Jiří, in cooperation with his fellow researchers, performed a comprehensive evaluation of the Silurian Ludlow–Přídolí boundary interval. In 1981, leading the Czech research team, he prepared a formal working proposal for the precise definition of the Přídolian, designated as the uppermost international Silurian stage, which was presented to the International Subcommittee on Silurian Stratigraphy. This proposal, after undergoing subsequent additions, was formally endorsed by the subcommittee during its 1983 session in Kyiv. In 1984, the International Geological Congress in Moscow approved the Přídolí Series as an internationally valid stratigraphic unit of the Silurian, and the boundary profile between the Ludlow and Přídolí at Požáry near Řeporyje as the Global Boundary Stratotype Section and Point (GSSP).

This, following the approval of the Silurian–Devonian boundary stratotype at Klonk near Suchomasty in 1972 and the lower–middle Devonian boundary parastratotype in 1981, was another phenomenal success for Czech geology and stratigraphy.

Thanks to Jiří Kříž, researchers worldwide now face the challenge of pronouncing the Czech letter “ř”. As he humorously put it, this was “retribution for the British Llandeilo (with the Welsh pronunciation ‘chchlandeilo’)”. He strongly advocated for applying the International Stratigraphic Guide and maintaining a clear separation between lithostratigraphy and chronostratigraphy. This initiative spurred discussions about renaming formations that shared names with stages or series. While not all his contemporaries embraced this idea, the meticulously precise Jiří ultimately proved correct on this matter as well.

Palaeozoic bivalves were Jiří Kříž’s primary and most beloved area of study. His extensive work in this field led to the description of 28 new genera and 120 new species. He described the oldest bivalve ever (1973), the oldest fossil pearls in bivalves (1979), and the first nektonic bivalve of the genus *Maida* (1996) from the upper Silurian. He also pioneered the description of a trend in the ecological strategies of Lower Palaeozoic bivalves



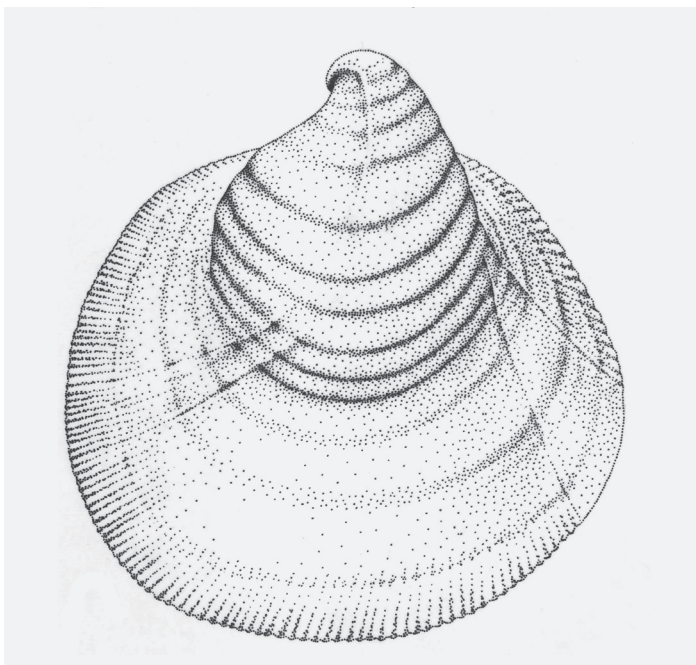
Jiří Kříž cleaning cephalopod limestones on the spa building in Prague-Smíchov at 14th October Square. Archive of Š. Manda.

(1984), enabling the distinction of categories such as infaunal, semi-infaunal, and epibyssate bivalves during that period. Jiří's meticulous systematic work involved describing Silurian and Lower Devonian bivalve faunas from peri-Gondwana and related biogeographical regions. This led to the identification of numerous assemblages crucial for international correlations and palaeoecological interpretations (1998, 1999).

It is truly remarkable that, in an era of multi-authored publications, Jiří single-handedly produced one of the finest palaeobiogeographical studies of marine faunas in these regions. Among the international Palaeozoic bivalve faunas he investigated, notable examples include those from Macedonia (1967), Romania (1975), Florida (1976), Serbia (1975), the Armorican Massif (1982), Montagne Noire (1996), the Carnic Alps (1999), Sardinia (1993), Taymyr (1995), Siberia (1995), and Morocco (2000). Another breakthrough is a paper from 1974 in collaboration with Pavel Lukeš on the original coloration of shells in fossil gastropods and gastropods from the Silurian and Devonian of Barrandien. During his time in the USA, he dedicated himself to studying recent bivalves, specifically their muscle systems. Although this work remains an unpublished manuscript, it serves as a fundamental basis for interpreting the lifestyles of Palaeozoic bivalves and warrants publication. Additionally, he investigated the ecology of the *Margaritifera margaritifera* in the Nová řeka (New river) in South Bohemia, with these studies appearing in two popular science articles in 1987.

Jiří Kříž possessed an unusually broad scientific scope at the “Survey”. He dedicated himself to mapping the Silurian formations of the Prague Basin and meticulously describing geological profiles, particularly temporary ones. He believed that high-quality geological mapping was as crucial as studying profiles layer by layer. To this day, much of our modern stratigraphy still relies on the legendarily precise profiles described by Jiří Kříž or Ivo Chlupáč. His extensive work on profiles and mapping led to a modern understanding of the Prague Basin as a rift structure, a concept initially proposed by V. Havlíček. Jiří further developed this concept for the Silurian, defining individual basin segments that exhibited distinct facies developments. This refined concept is exceptionally well presented in the still widely used guide for the Silurian Subcommittee (1992). A particularly significant discovery from Jiří's geological mapping was the richly fossiliferous volcanosedimentary development of the lower Silurian near Hýskov (1973). This finding forever altered our perception of the “lower” Silurian of the Prague Basin, which had previously only been known for its shale development. Therefore, the trilobite *Aulacopleura krizi* and the dendroid *Thallograptus krizi* are described from Hýskov. It was characteristic of Jiří that he entrusted the description of the abundant trilobite fauna from Hýskov to Milan Šnajdr. Šnajdr had been removed from a high party function after the political turmoil of 1969/1970 and reassigned to the Survey's collections. The description of the Hýskov trilobite fauna thus marked M. Šnajdr's return to exceptionally productive research into Czech trilobites after an almost fifteen-year hiatus.

Jiří Kříž's leadership extended to numerous international IGCP projects focused on geological correlations. Beyond his primary work on the Palaeozoic, he also made significant contributions to Cretaceous geology. He co-authored the still-valid lithostratigraphic division of the Cretaceous (1980), which resolved a long-standing period of confusion in the classification of Cretaceous layers and formations. His research in this area also encompassed Cretaceous bivalves, foraminifera, and trace fossils of bivalve borings in wood. In the 1980s, Jiří directed an internal project at the “Survey”, investigating the geological substratum of sites in eastern Bohemia and Moravia suitable for nuclear power plant construction. Later, in the 1990s, he led research to select prospective sites for high-level radioactive waste disposal. The findings from these critical studies remain valuable background information today.



Slava cubicula, a line drawing prepared for print (Kříž 1985).

Jiří's expertise extended far beyond his home country, gaining significant recognition internationally. He dedicated extensive research to the Silurian and Devonian periods in numerous global locations, including the Armorican Massif and Montagne Noire in France, Florida and the Appalachian Mountains in the USA, the Carnic Alps of Austria and Italy, England, Estonia, Sweden, Ukraine, Australia, Morocco, Spain, southern China, and other parts of the world. He was known for precise publishing the findings of his international research, ensuring his contributions were widely accessible.

At the "Survey", Jiří also held the position of head of the Department of Regional Geology of Sedimentary Formations for many years. He retired in 2007 but continued to work part-time, eventually transitioning to an emeritus researcher role. Even in retirement, health permitting, he remained highly active in publishing scientific articles and contributed several chapters to the newly prepared *Treatise of Invertebrate Palaeontology*. Jiří Kříž's perfectly maintained bivalve collection was donated in its entirety to the Czech Geological Survey. Comprising almost 20000 specimens, it stands as the largest collection of Palaeozoic bivalves in the world, rivaled only by John Pojeta's collection at the Smithsonian Institution. This collection is also exceptionally well-managed, featuring numerous precise notes accompanying carefully labeled specimens.

Jiří Kříž's contributions were not limited to geology, palaeontology, and stratigraphy. As early as 1965, he played a significant role in the pioneering research of the Karlštejn castle well, collaborating with members of the Karst Section of the National Museum Society, including Jaroslav Hromas, Petr Hradecký, Lenka Schmittová (later Hradecká), and Vladimír Lysenko. Jiří was also a pivotal figure in nature and landscape protection in the Czech Republic. In 1979, he joined the newly established Czech



Cardiolinka bohémica from the Požáry Formation of the Czech Republic. Photo by J. Kříž.



Snoopyia insolita from the upper Silurian of France. Photo by J. Kříž.



Panenka debilis from the upper Silurian of France. Photo by J. Kříž.

Union for Nature Conservation (ČSOP). From 1979 to 1990, he chaired the ČSOP's Central Control and Revision Commission, which increasingly voiced critical opinions on the state of the environment in public discourse. He was a member of the Prague 8 group, dedicated to safeguarding protected areas and organizing numerous regular conservation brigades. This included maintaining green spaces like the park of the Bohnice Psychiatric Hospital, home to many valuable trees. Jiří proposed for protection most of Prague's now internationally recognized and significant geological profiles and palaeontological localities. Each proposal required extensive data collection, surveying, bureaucratic procedures, and negotiations with state authorities. For instance, his intervention ensured the Barrandov Bridge project didn't damage the famous KUKUK locality. To enhance the protection of geological sites, he also became a founding member of ProGEO (International Association for the Conservation of the Geological Heritage). He served on the committee of the European Association for the Conservation of Geological Heritage ProGEO as a national correspondent for the Czech Republic, and from 1998 to 2019, he chaired the Czech section of ProGEO.

Beyond his scientific endeavors, Jiří Kříž was deeply committed to popularizing science and conservation. He authored or co-authored several books and brochures on nature protection, particularly focusing on Prague and Barrandian. Notable examples include *Chráníme naši přírodu* [We Protect Our Nature] (Strejček *et al.* 1983) or the guide to the Prokopské Valley educational trail (Kubíková & Kříž 1981). The factually exhaustive Geological Monuments of Prague (1999) is also noteworthy. He actively lectured on nature conservation (especially geological objects). He led and organized general excursions into the nature of Bohemia and geological excursions for foreign and domestic enthusiasts into the Prague Basin and other geological areas of Bohemia, Moravia, and Slovakia, for example, regular “Kříž's crusades” for the Štefánik Observatory. From all his travels, where he liked to photograph more than geological formations alone, he had slides made and lectured to the public about foreign countries. His lectures were well-attended because, during the period of real socialism, most people did not get to see the West. Even though many geologists travelled the world, few were willing to lecture about these trips as insightfully as Jiří. During many trips to Sardinia, he managed to document changes caused by tourism. Jiří also devoted himself to the history of palaeontology, especially Joachim Barrande, about whom he wrote several articles and a still unsurpassed small book (1999). He also researched Barrande's localities with regard to the collection methods of that time. He also participated in the undeservedly forgotten documentary film about J. Barrande for high schools (accessible at <https://www.youtube.com/watch?v=wIcuqj8ft8k>).

Jiří Kříž's prolific career resulted in over 210 scientific papers and monographs, many of which he authored or co-authored as the lead. He also penned numerous popular brochures and several books. Early in his career, after his initial publications in *Časopis pro mineralogii a geologii*, his time in the USA quickly led to articles in highly esteemed international journals including *Nature* and *Science*. It is important to remember that, at the time, publishing in foreign periodicals was quite restricted, often requiring official approval. Articles by domestic authors were in high demand as they facilitated the sale of Czech journals to countries with convertible currency. Jiří consistently upheld a high standard of work and actively exchanged reprints with numerous experts globally. Before the age of digitalization, many publications were difficult to access. Jiří was always generous, readily lending colleagues materials they needed that were unavailable in libraries.

Informally about Jiří or flying out of Dědek's (Grandpa) nest

After detailing his professional activities, results, and contributions, here we comment on Jirka (diminutive of the name Jiří) as a person. He was a unique individual, direct, firm in his principles, and shaped by clear rules. Jiří arrived at work every day at 5:30 a.m. via the same tram line, and he applied a similar order to everything. Jirka was good company and a lot of fun to be with, but on the other hand, his direct opinions, spoken bluntly to one's face, could often infuriate (to such an extent that anyone who experienced it would find any euphemism inadequate). However, they usually prompted a necessary shift in one direction or another, and that was precisely their intent. According to Jirka's own autobiography, his hobbies included macrophotography, living plants, mushrooms, nature, and cooking. Jiří disliked communism, religion, philosophy, and sports. He loved music and always listened to Country Radio while working.

A significant figure shaping the beginnings of Jiří's professional work was Jaroslav Petrboř. Jirka wrote about him in his autobiography: "*We spent eight years together, when on Sundays I helped him uncover sediments in a cave in the quarry on Kobyla Hill, right next to Zlatý Kůň near Koněprusy. Petrboř, whom his close friends and good acquaintances called 'Grandpa' and I called 'Mr. Professor', subtly taught me by example how one should behave towards nature and towards other people. He was an eccentric, proud, and tough man who could tell another person an unpleasant truth to their face.*" Jaroslav Petrboř influenced many natural scientists, and the company around him was quite peculiar and certainly formative. At the same time, the vast majority of palaeontologists and geologists of that young generation came from this breeding ground. Jirka occasionally recounted stories about Petrboř, many of which were not entirely or at all true. However, according to stories authorized by Jirka himself, a lot could indeed happen around Petrboř. We must realize that contact with Petrboř, which even caused Jirka problems at school, was not without risk at this time, and speaks to the courage of Jirka and his parents. Petrboř was considered an anarchist by the communists and, incorrectly, also a Zionist. Here is one anecdote that illustrates a certain forthright expression. Once, while traveling a bus to Koněprusy, Petrboř loudly criticized the conditions, and someone asked him, "Are you not afraid to speak like that, Mr. Professor?" Petrboř replied, "Those who are afraid drive cars".

The second significant event was Jiří's arrival at the "Survey", where he met, among others, Vladimír Havlíček, Ivo Chlupáč, Rudolf Prokop, and Radvan Horný, who professionally supervised him. This was quite a remarkable company too. Jirka long refused to use the informal "ty" [you] form of address with his older colleague Horný, so one day, during mapping, Horný sent Jirka into a well excavation for rock samples. When Jirka began to climb out, Horný asked, "Will you finally use 'ty' with me?" "But Mr. Doctor..." and then came a spit, and then the same question – and so, eventually, they started using "ty" with each other.

The systematic nature and precision of Jirka's work were truly admirable. Jirka's motto was: "Every day, when you leave work, have your things organized so that anyone who comes after you can continue your work." And at the same time, "Work so that you leave work healthy" – a motto that we, such a hurried generation, should have carved in stone. Few had such a precisely tidy desk and yet were so incredibly productive.

Jirka was once fascinated by Barrande's playful naming of bivalves, both genera and species. The genus *Panenka* (in contemporary Czech often meaning bride) paired with a Latin or Greek adjective: small, large, thick, thin, but also foolish or arrogant. He was also intrigued by Barrande's species *Orthoceras*



A Christmas and New Year's greeting card that shows what Jiří Kříž loved – the Bohemian Karst and bivalves. Archive of Š. Manda.



The valley of the river Berounka took by Jiří Kříž in 1991 showing very nice composition of the photo.

scabiosum (infested with lice) or *Lingula debilis* (weak, slender, feeble-minded – this brachiopod is very tiny or stunted). He himself named the bivalve genus *Isiola*, which is the first name of Alois Přibyl spelled backward. Not recognizing this Přibyl himself asked for the origin of the during Jirka's dissertation defense. *Pygolfia* is named after his friend Rudolf Prokop's nickname (Rudolf in Russian = Pygolf). He himself experienced something similar when, during a period of certain tension, Vladimír Havlíček named the species *Bleshidium krizianum* after him (from Czech word blecha meaning flea in English). Jirka also gave poetic species names like *cubula* and *cubicula* after fairy-tale characters. He even named the genus *Snoopyia* after the iconic animated character, sending the relevant description to the character's creator, so his desk was adorned with a Snoopy poster and a plaster figurine of him. The new species *Slava sathon* owes its name to Jirka's imagination; from a certain angle, the bivalve shell looks like its name, and curious readers are directed to a Greek dictionary. But we also have names after his granddaughter and grandsons, colleagues, collectors, etc. Jirka claimed that the greatest foolishness is to name a species after one's wife or girlfriends at all, because the name turns bitter with a breakup. In the end, however, he changed his mind and named the genus *Janicula* after his beloved third wife, and he did not regret it.

Jiří loved to cook and was a culinary artist in the best sense of the word, saying that good food is the sex of old age. He also liked to get recipes from abroad and constantly tried to cook them at home until he perfected the dish. He loved inviting foreign colleagues and domestic friends to his home and cooking Czech meals for them. Many years ago, books were discarded from the "Survey's" ROH trade union library. Among the acquisitions from the 1980s was a book called Russian Cuisine, which, according to the reader's card, only Jirka borrowed. This testifies to his impartiality at a time when most people of Jirka's disposition a priori rejected anything Russian. Jiří compiled recipes in his cookbook, which he also gave to his friends. Initially, it was called 333 Recipes, How I Cook and Like Them, gradually growing by a hundred recipes to 444, until it ended with a break in the series at over a thousand recipes...

Jiří meticulously organized and described everything he collected during his life – fossils, books, reprints, photographs, recent bivalves, locality descriptions, correspondence – and handed them over to public institutions. He was a lover of nature, especially the Bohemian Karst, and was active in nature conservation, and unlike many, he significantly put his hand to the task (the Prague 8 branch of the ČSOP, which he led for a long time, cared for 40 hectares of protected areas). When Jirka read the biography of František Palacký, he was struck by the principle that one should end each day in such a way that if one died, no one should have any work with one's belongings (see Jirka's paraphrase of this principle above). Jirka literally fulfilled this! Many will remember Jirka fondly, some perhaps differently, but we could all be inspired by his approach that we should not leave a mess behind...