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Geological museums. Collections, expositions, popularization - on the 100th birthday of Eufrozyn Sagan

Old Mine Science and Art Centre in Wałbrzych
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ABSTRACTS

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Eufrozyn Sagan and his predecessors – an overview of the history of paleobotany collections in Wałbrzych

In 1947, when Eufrozyn Sagan arrived in Wałbrzych, several valuable paleobotany collections in the town were being liquidated and built from the ground up at the same time. The collections were held at the Mining School located at Pankiewicza Street, in the Museum at 1 Maja Street and at the Local Station of Polish Geological Institute (PIG) in Szczawno-Zdrój at Słowiańska Street. After Georg Anton Volkmann's *Silesia subterranea* was published in 1720 in Leipzig, as a kind of a portent of a future branch of science – paleobotany, with descriptions and illustrations of Carboniferous fossilized plants found in the area of Wałbrzych, a period of systematic collecting and amassing ensued. With time, large and valuable collections were amassed and deposited in several institutions. One of such collections, the oldest and the most diverse, was deposited at the Mining School (Niederschlesische Bergschule) at 5 Pankiewicza Street. Its greatest contributor was Adolf Schütze, the school's head teacher in 1858 – 1900. He was a tireless and enthusiastic collector who published inventories of fossilized plant genera and species. He also made them available to contemporary researchers who specialised in this area, such as the progenitor of German paleobotany Heinrich Göppert from Wrocław, or Dionyz Štur from Vienna. The collection also included original collections by H. Weyland, H. Potonie, R. Zeiller, W. Gothan and F. Zimmermann filled with holotypes of new plant species from the Devonian and Carboniferous periods. The value of the exhibits is attested by the number of publications dedicated to them, which totals 18. In 1947 the entire collection of the Mining School was moved by S. Doktorowicz-Hrebnicki to the Geological Museum of the Polish Geological Institute in Warsaw, and irreversibly lost for the town.

The person who naturally integrated all the collections located in Wałbrzych was the geologist, paleobotanist and museologist Franz Zimmermann (1890-1959). With his collections and publications he made an important contribution to the exploration of the Devonian and Carboniferous flora. In 1920 he took up a job as a Geography teacher at the Mining School and as a curator of the school's collection. In 1926, as a member of the Wałbrzych Museology Society (Waldenburger Museumverein e. V.) he co-created the Museum of Wałbrzych (Heimatomuseum) and served as the curator of the Geology and Paleontology Department, organized since 1908, which gathered exhibits accumulated as early as in the 1830s. From that moment on, he worked on collections for both of the institutions. At the same time he served as the correspondent for the Prussian Geology Bureau in Berlin and published papers alone and in cooperation with Walther Gothan. After World War II he worked for the Local Station of the Polish Geological Institute in Szczawno-Zdrój where he compiled yet another large collection in 1948-1956, with around 4,000 exhibits. In 1957 he left Poland and, despite the fact that the printing was complete, his synthesis of Carboniferous flora in the Wałbrzych Basin was not published. His collection went through a lot and eventually it ended up in the Lower Silesian branch of the Polish Geological Institute located in Wrocław, in a reduced size. Yet another collection with a great research, scientific and expositional potential lost for Wałbrzych.

Eufrozyn Sagan, unofficially a student of Franz Zimmermann, from his first days in Wałbrzych started to work on his own collection that is currently located in the Old Mine Science and Art Centre in Wałbrzych. The collection includes around 5,000 exhibits, with many being priceless, including rare examples of terrestrial and freshwater fauna

of the Late Carboniferous with unique species, some of them unspecified. The 100th anniversary of Eufrozyn Sagan's birth and 300th anniversary of publication of the historic work of Volkmann: *Silesia subterranea*, lead one to reflect on the lives of many incredible people that were filled with passion. It is a good occasion to highlight the important role of Wałbrzych in the development of paleobotany, and an incentive to engage in responsible action for preservation of the heritage and handing it down to new generations in an appealing format.

Sławomir Florjan, Centre for Natural Science Education

The research of Eufrozyn Sagan into Carboniferous flora and its significance in the context of contemporary paleobotany

The research activity of Eufrozyn Sagan centred primarily on the issues of Carboniferous flora. It had two major aspects – assembly of a scientific collection of fossilized Carboniferous macroflora and work on specific aspects with results published.

During his long-lasting search, Sagan managed to amass a collection of flora largely representative of the Lower Silesia Coal Basin (and Wałbrzych area especially) with fossils from all major taxonomic ranks. The specimens collected were subject to appropriate preparation. Sagan penned 8 paleobotany papers, including 2 atlases of Carboniferous flora, with thorough descriptions, the only publications of this kind ever published in Polish that can be used by beginners, college students as well as researchers. He conducted an analysis of macromorphology of seed ferns of the still taxonomically problematic *Sphenopteris* s. l., genus; *Eleutherophyllum* characteristic of Carboniferous flora of the Lower Silesia, and a species of *Lepidodendron* - *Lepidodendron veltheimii*.

Paleobotany papers of E. Sagan:

- Sagan E. 1962. Opis szczytowych części łodyg paproci nasiennej (Pteridospermae) *Sphenopteris dissecta* Brongniart. (Description of the upper section of seed fern stem (Pteridospermae) *Sphenopteris dissecta* Brongniart.) Biuletyn Informacyjny. Polskie Towarzystwo Miłośników Nauk o Ziemi. Koło w Wałbrzychu, Wałbrzych, November 1961: 4–5.
- Sagan E. 1962. O preparowaniu flory karbońskiej (On preparing Carboniferous flora) Biuletyn Polskiego Towarzystwa Miłośników Nauk o Ziemi, 4: 10–11.
- Sagan E. 1963. Budowa morfologiczna poduszeczki liściowej u *Lepidodendron veltheimii* Sternberg. Streszczenie. (The morphology of the pulvinus of *Lepidodendron veltheimii* Sternberg. Abstract.) Sprawozdania Wrocławskiego Towarzystwa Naukowego, series B, 18: 22–24.
- Sagan E. 1965. Nowe szczegóły morfologiczne paproci nasiennej *Sphenopteris bermudensisiformis* (Schloth.) Behrend. (Newly discovered morphological features of seed fern *Sphenopteris bermudensisiformis* (Schloth.) Behrend. Instytut Geologiczny, Biuletyn (Z badań geologicznych na Dolnym Śląsku V. XI), 185: 247–263.
- Sagan E. 1966. Budowa morfologiczna poduszeczki liściowej *Lepidodendron veltheimii* Sternberg. (The morphology of the pulvinus of *Lepidodendron veltheimii* Sternberg) Prace Wrocławskiego Towarzystwa Naukowego, series B, 133: 1–38.
- Sagan E. 1980. Neuentdeckte morphologische Einzelheiten von *Eleutherophyllum mirabile* Stur, *E. waldenburgense* Zimmermann und *E. drepanophyciforme* R. et W. Remy. Acta Palaeobotanica, 21(1): 9–26.
- Sagan E. 1981. Atlas roślin karbońskich na podstawie zbiorów Muzeum Okręgowego w Wałbrzychu. Rośliny widłakowe (Lycophyta) (Atlas of Carboniferous plants based on the collections held at the District Museum in Wałbrzych. Lycophyta). Muzeum Okręgowe w Wałbrzychu, Wałbrzych.

- Sagan E. 1983. Atlas roślin karbońskich na podstawie zbiorów Muzeum Okręgowego w Wałbrzychu. Rośliny skrzypowe (Equisetophyta). (Atlas of Carboniferous plants based on the collections held at the District Museum in Wałbrzych. Equisetophyta). Muzeum Okręgowe w Wałbrzychu, Wałbrzych.

Izabela Olczak-Dusseldorp, Włodzimierz Mizerski, Tatiana Woroncowa – Marcinowska,
Katarzyna Skurzyńska-Garwolińska, Polish Geological Institute (PIG) - National Research Institute (PIB) in Warsaw

**Major paleobotany collections of the Geological Museum of the Polish Geological Institute
 and National Research Institute in Warsaw.**

The PIG-PIB Geological Museum in Warsaw has paleontology, mineralogy and lithology collections. A small department marked III has 89 collections of fossil flora. The paleobotany collections represent a very wide spectrum of fossil plants, both in terms of taxonomy and age. They include seeds and fruit, imprints of leaves and shoots, cones, macrospores and timber. They include fossilized plants from the Devonian period to the Quaternary.

A great scientific value is represented by a collection of the German researcher H. Weyland from 1931 that covers Devonian flora from the Rhenish Slate Mountains and the Czech Republic. The Devonian flora from the area of Wałbrzych collected by W. Gothan and F. Zimmermann constitutes a valuable collection of great historical value. Traces of the oldest complex root system make up the collection of P. Szrek, S. Salwa and G. Niedźwiecki from 2015.

In 1947 the museum collection was enriched with exhibits taken over from the Mining School in Wałbrzych, which represent primarily the Devonian flora of Wałbrzych area and Carboniferous plants characteristic of Silesia and Western Europe. And so the museum was enriched with collections from 1877-1937 of prominent paleobotanists such as D. Štur, H. Goeppert, R. Zeiletra, F. Frech, H. Potonié and others. High documentary and expository value lies in the collection of Carboniferous flora of A. Makowski from black coal mines in the Czech Republic, collections of silicified trunks and leaves of Carboniferous plants from Silesia collected by J. Krzyżkiewicz, S. Doktorowicz-Hrebnički, S. Karczewski, T. Bocheński and collections of S. Tyski and H. Drygalski.

A small part of the collections is made up of flora from the Permian and the Mesozoic. Another noteworthy collection is the one of the Jurassic flora from the Mesozoic borderline of Świętokrzyskie Mountains and exhibits of plants from the Łuków floe. The collections of Cretaceous flora include exhibits primarily from Świętokrzyskie Mountains, Middle Vistula Valley and Lower Silesia.

In relation to Mesozoic collections, the collections of Neogene flora, especially the Miocene, seem to be really interesting. The collection of Miocene flora is made up of pre-war collections of Sujkowski from the Lviv and Mizoch region and flora from Zalesiec next to Wiśniowiec. Well-preserved plants in the form of imprints from the evergreen oak and laurel forests with palms make up the collection of J. Raniecka–Bobrowska from Osieczów nad Kwisą and Sońnica next to Kąty Wrocławskie. A great research value lies in the deciduous plants, megaspores, seeds and cones collected in the brown coal mines in Konin, on sites located in northern Poland, foothills of the Sudetes and the area of Środa Wielkopolska. The collections of Miocene flora enlarge the collections of E. Ciuk, I. Grabowska, R. Podstolski and others.

The Cenozoic is represented by the flora from the Pliocene collected in the Pieniny Mountains which makes up the collections of W. Szafer and L. Horwitz, several collections of the Quaternary flora by E. Ruhle and W. Karaszewski and a collection of seeds and toadstools from the Pleistocene collected in the area of Konin and Suszno nad Bugiem. The youngest paleobotanical exhibits in the museum – around 2,000 years old oak trunks, were found in the sulphur mine in Piaseczno.

The paleobotany collections amassed in the PIG-PIB Geological Museum are valuable in terms of research, exhibitions and teaching.

Tatiana Woroncowa-Marcinowska, Izabela Olczak-Dusseldorp, PIG-PIB, Warsaw

**The collections of fossil flora from the Mining School in Wałbrzych (19th-20th century)
in the PIG-PIB Geological Museum Warsaw.**

In 1947 the Geological Museum's collection was enriched with collections moved from the Mining School in Wałbrzych, which represent primarily Devonian and Carboniferous flora from the Lower Silesia and Western Europe. The Mining School in Wałbrzych, which trained senior mining personnel, was founded in 1838. After more than 100 years, its operation was disrupted by the outbreak of World War II. The fossils that the museum received (over 2,600 exhibits) were catalogued as 10 collections (MUZ PIG 8.III. – 16.III. and 29.III.) in Department III - Paleobotany & Stratigraphy. The collection no. 8.III. entitled "School Stratigraphy Collection" is a teaching-oriented collection that presents Carboniferous flora from the Lower Silesia while collections 9.III., 10.III. and 29.III. contain exhibits from the country and elsewhere with flora from various geologic periods – from the Carboniferous to the Tertiary.

A far greater research value is offered by original collections that served as the basis for monographs with descriptions of new species (collections no. MUZ PIG 11.III.-15.III.). The collections of the German researcher H. Weyland from 1931 (11.III.), which contain rare Devonian flora from the Rhenish Slate Mountains and the Czech Republic, hold an enormous value for scientists and collectors. The collection of F. Zimmermann (13.III.) also represents rare Devonian flora from the area of Wałbrzych.

The exhibits that make up collection no. 12.III. are original examples of Late Devonian flora and were used by two prominent botanists of the first half of 20th century for their papers: W. Gothan and F. Zimmermann: from 1932 and 1937. The original exhibits that make up collection no. 14.III. (226 exhibits) served as the basis of papers of a renowned Slovak paleobotanist from Vienna written in 1877 and 1885 - D. Štur, in 1913 by W. Gothan from Berlin, in 1930 and 1932 – F. Zimmermann and in 1936 and 1938 – by researchers: W. Gothan and F. Zimmermann. Similarly, collection no. 15.III. presents exhibits of various authors, among them prominent botanists: F. Zimmermann, H.R. Göppert, H. Potonié, R. Zeiller, O. Feissmantel et al. The exhibits served as the basis for papers by R.H. Göppert from 1859, O. Feisstmantel from 1874, D. Štur from 1877 and F. Frech from 1899. The largest flora collection from the area of Wałbrzych is included in collection no. 16.III. (1,500 exhibits). The author of the collection, F. Zimmermann, a long-standing teacher at the Mining School in Wałbrzych, for 10 years after World War II was occupied with paleobotany and geology in Wałbrzych mines, as a member of the staff of the Institute of Geology and employee of the Local Substation in Szczawno-Zdrój.

Paweł Raczyński, Anna Setlik, Museum of Geology, Institute of Geological Sciences, University of Wrocław

Fossilized Carboniferous flora in the Museum of Geology of the University of Wrocław

The origins of geological museology at the University of Wrocław go back to the foundation of the Mineralogy Cabinet in 1812. Just like its successors, the Museum of Mineralogy amassed not only minerals, but also rocks, minerals and fossils. In the second half of the 19th century the exhibits were catalogued by subject and from that moment on the University has had two museums: Museum of Mineralogy and Museum of Geology. The Museum of Geology holds primarily geological and paleontological collections, including rocks and fossils from Lower Silesia.

The paleobotany collection includes 7,500 inventory items, including 2,065 exhibits from the Carboniferous. The majority of the exhibits were collected in the 19th and at the beginning of the 20th century, but the collections are still being enlarged with new exhibits – at the end of 2016 they were enriched with a new exhibit from a spoil tip in Wałbrzych. The first publication that involved plant fossils deposited in the museum was *Systema filicum fossilium* by H.R. Göppert, published in 1836. It contains illustrations of, e.g. Carboniferous exhibits from Wałbrzych.

There are 270 exhibits from the Early Carboniferous, primarily from the exposed sites in the Sudetes: Culm of the Owl Mountains, the Bardzkie Mountains and Middle Sudetic Synclinorium. Other interesting exhibits include imprints of plants made in schist from a location in Moravia - Staré Oldřůvky (German: Altendorf). The collection is composed of 16 exhibits amassed by A. Halfar in 1865.

85% of our collections are made up of exhibits from the Coal Measures, primarily from coal basins. They were collected in Upper and Lower Silesia, in the Czech Republic, Germany, Belgium, Portugal, Switzerland, United Kingdom and Spain. Exhibits collected outside Europe include 53 pieces from the famous location Mazon Creek in Illinois, USA, preserved as spherical siderite concretions, by Kemny, Gurley, Miller, from 1880-1890. The Lower Silesia region is represented by 820 pieces; 430 come from Wałbrzych and the area, 30 from the area of Kamienna Góra and Lubawka, 360 from Nowa Ruda region. The exhibits come from old mines, i.e. younger beds, mined first. There are also exhibits amassed by Eufrozyn Sagan in 1958-1961 in the Thorez mine: two *Lepidodendron veltheimi* Sternb., two *Lepidodendron* sp., *Eleutherophyllum waldenburgense* Stur, *Bothrodendron verticillatum*, *Stigmara ficoides* Brongn.

The largest original collection belongs to H.R.Göppert (over 800 inventory items, primarily from Poland and Germany). The development of paleobotany was largely influenced by his pioneering papers from 1836-1866, including works on Carboniferous flora with numerous types created on the basis of the collections of MG. The collections of the museum were used by a number of authors to illustrate publications on the Carboniferous system. To give an example – the atlas by F. Roemer - *Lethaea geognostica. Lethaea palaeozoica*, Stuttgart 1876, or a textbook on regional geology of the Upper Silesia by the same author: *Geologie von Oberschlesien*, from 1870. The morphology and systematics of Carboniferous plants is discussed in, e.g.: R. Florin, 1938-1945- *Die Koniferen des Oberkarbons und des unteren Perms*. *Palaeontographica*, Abt.B, Bd.85, Lfg.1-8. 1-729, or M. Hübers, H. Kerp, 2011 - The genus *Fryopsis* Wolfe (al. *Cardiopteris* Schimper): A taxonomic revision. *Rev. of Palaeobotany and Palynology*, 167, 230–241.

The collections, most of which were compiled in the 19th century, today require a new description based on the new findings of literature. It is also possible to use them for other research studies. Currently, there is a project in place that involves a search for Microconchida on exhibits of flora, fish remains and other fossils, preserved in flora specimens.

Kazimierz Kozakiewicz, Polish Society of Earth Science Friends – departament in Wałbrzych

Eufrozyn Sagan – a museologist and promoter of Earth science with a flair for science

Eufrozyn Sagan was the youngest of eight offspring (sons only) of Andrzej Sagan, a county veterinary physician. His father, with the profession he learnt and practised, undoubtedly had a huge impact on his sons' interest in nature. Just like his father and some of his older brothers, Eufrozyn Sagan resolved to pursue the profession of a naturalist. After he passed his final secondary school exam, he entered university to study natural science, but his education was disrupted by the outbreak of World War II. Shortly after the war, he found himself in Wałbrzych, where he was offered a job at the museum. The education he received during three years of university studies and long cooperation with the German geologist and paleobotanist Franz Zimmermann in Wałbrzych, inclined him to choose paleobotany as a career. Throughout the years when he served as the head and deputy head of the Wałbrzych museum, he was practically the curator of the Geology Department. He enlarged and prepared paleobotany collections. He cooperated with the

scientific circles in the country and elsewhere. He tried to publish the results of his work and to popularise natural science, primarily geology, among the inhabitants of Wałbrzych and the region. He received a number of awards from state and local authorities for his professional accomplishments and was recognised for his contribution to popularisation of Earth science by the Polish Society of Earth Science Enthusiasts (currently: Polish Society of Earth Science Friends - Polskie Towarzystwo Przyjaciół Nauk o Ziemi) whose member he was.

Grzegorz Pacyna, Department of Taxonomy, Phytogeography and Paleobotany Institute of Botany, Jagiellonian University

The animals of Carboniferous forests in Lower Silesia - old and new findings.

The Carboniferous terrestrial and freshwater fauna of the Lower Silesia ranks among the earliest known, most interesting and diversified faunas of coal basins in Carboniferous Europe. In the second half of the 19th century and the first half of the 20th century German geologists and paleontologists described a great number of exhibits. Sadly, a large portion of those were lost during World War II or their location remains unknown. The first mention of Carboniferous terrestrial fauna in the Lower Silesia was made by Roemer (1878). He described a new species of an arachnid from the Late Carboniferous found in the area of Nowa Ruda: *Architarbus silesiacus*. Based on this discovery, Fritsch (1904) established a new genus: *Vratislavia*. In the same area (the Westphalian A) Karsch (1882) found and described a new genus and species of Trigonotarbida: *Anthracomartus voelkelianus*. One of the exhibits from the partly preserved collection of Karsch has recently been revised as *?Trigonotarbus* sp. (Dunlop and Rössler 2002). In 1935 Schwarzbach collected information on arachnids from Lower Silesia and found a new in the region species: *Anthracomartus granulatus*. On the basis of an exhibit of E. Sagan from the Late Visean in Kamienna Góra, Dunlop and Rössler (2003) described a new genus and species: *Schneidarachne saganii*, an arachnid presumably related to solifugae. Guthörl (1936) described myriapods from the genus: *Arthropleura* with species: *Arthropleura armata* and *A. maillieuxi*, found in the Žaclěř formation from the Westphalian A and B. The most detailed description of the Carboniferous fauna of Lower Silesia was penned by Hoehne (1948). In this work, he compiled information on all earlier discoveries in the area, he used papers previously published by German authors as well as unpublished information on fauna collected by F. Zimmermann and descriptions of exhibits included in the collections at the Mining School in Wałbrzych. According to Hoehne, the fauna of Namurian A includes bivalves, crustaceans from the phyllopoda group, eurypterids and sarcopterygii from the *Rhizodus* genus. The fauna of the Westphalian A is composed of the above-mentioned arachnids and *Arthropleura* myriapods. For the Stephanian, Hoehne lists fish teeth and phyllopoda. After the war, the interest in Carboniferous terrestrial fauna faded as new exhibits were rare and they were not stratigraphically significant. The search centred on marine fauna or freshwater fauna (mainly bivalves) that allowed for determination of the age and correlation of strata. During the post-war period, in the 1950s and 1960s, Eufrozyn Sagan amassed a large collection that was subject to preliminary preparation (Sagan 1967, Zdebska et al. 2005). The exhibits of Sagan were found mainly in the Wałbrzych formation (the Namurian A). The following groups of animals were identified there: crustaceans (*Leaia* sp.), eurypterids (*?Adelophtalmus* sp.), horseshoe crabs (*Pringlia* sp.), Trigonotarbida arachnids (*Aphantomartus areolatus* and two unidentified species), myriapods from Arthropleurida group (*Arthropleura* sp.) and millipedes (probably 3 species) and gastropods (*?Straparollus* sp.). Private collectors keep finding valuable specimens of terrestrial animals on spoil tips. Some of those have been published (Florjan et al. 2012, Pacyna et al. 2012).

Wiesław Krzemiński, Katarzyna Kopeć, Institute of Animal Systematics and Evolution, Polish Academy of Science (PAN), Cracow

An interesting exponent of Carboniferous myriapods from Palaeosomatidae family from a collection of E. Sagan from Wałbrzych.

The collection of E. Sagan compiled in 1967 on a spoil tip at "Jan" Mine in Biały Kamień included a fascinating example of Carboniferous myriapod (Namurian A). In a study conducted in conjunction with dr J. Hanibal from Cleveland Museum of Natural History, Ohio, USA, who specialises in the study of fossil myriapods, we had a chance to compare our exhibit with specimens from England. The study revealed that the specimens from Wałbrzych and England belong to a new, so far unknown, family of **Palaeosomatidae**. The family currently includes two species, i.e. *Palaeosoma giganteum* and *Palaeosoma robustum* described in 1911 by Baldwin on the basis of specimens from the Carboniferous of England. The species found in Biały Kamień turned out to be very similar to *Palaeosoma robustum*.

dr Ronny Roessler, Museum für Naturkunde Chemnitz

The Chemnitz Museum of Natural History – source and result of knowledge

The museum collection of the Chemnitz Museum of Natural History has been a constantly growing, developing and limitless source of knowledge on the relation of Earth's history and the development of life on Earth, for over three centuries. Initially founded by science interested citizens on a voluntary basis in 1859, only with the premise to enable public access to collections and scientific information, it has developed and has been structuralized based on professional geoscientific considerations. Today, the collection is preserved, extended by selected purchases, diversely used and it serves as a foundation for globally linked up scientific research, as well as for interdisciplinary exhibitions and diverse educational programmes and activities. The essence of the collection documents the evolution and preservation of terrestrial ecosystems with a special emphasis on volcanic environments and petrified wood.

Present-day research focuses on the museum vision and pervading the other keystones of a museum, such as conservation, collection, exhibition and education. Based on the historically evolved collections and related activities, since 1995 the museums' collection and research conceptions address traditional fields again, such as the occurrence, formation, fossil record, and palaeoecology of petrified forests, particularly those from Carboniferous and Permian times, and systematics, taphonomy and evolution of Paleozoic arthropods as well. Thus studying historical and recent exhibits to provide any additional insights for the understanding and maintaining of life on our planet makes up our mission. Therefore we are certain that historical collections are not ultimate but anxious for consequent enhancement and new scientific interpretation. Our recent excavations within the area of the city provide an excellent connection between historical collections and pioneering research. As expected for a museum, the professionals are faced with the public and citizen scientists as well in their daily work. In talks, events and guided tours they present first-hand knowledge and have the opportunity to answer the visitors' questions experiencing their advice, suggestions and perspectives.

Stanisław Firszt, Museum of Natural History in Jelenia Gora/Cieplice

Who benefited most from the specialisation of museums in Lower Silesia

The process of specialisation of institutions, museums included, is nothing new. It results from collecting traditions that emerged at the time of Enlightenment, in the 18th century. At that time, enormous collections were

compiled at the request of rulers or other influential persons. There were all kinds of trends in place, at some point or other any of the following were fashionable: ancient arts, ancient Egypt, cultures of South America, primitive African and Asian art, numismatics, sigillography, rocks and minerals, fossils, plant and animal specimens, etc. Sometimes, huge collections were compiled in one place out of various groups of exhibits. There were church and municipal collections.

That was how large museums with multiple departments came into existence. Usually, they specialised in their specific regions. They held all kinds of exhibits concerned with a specific town and its inhabitants. It was not uncommon that private collectors donated their valuable collections compiled during their travels around the globe to such institutions. This is how municipal museums came to acquire strange objects not at all connected with their specific region (objects of nature and ethnography from all over the world). It happened all over Europe.

The same applied to private collections held in castles and palaces that were abundant also in Lower Silesia. The composition of such collections hinged mainly on the interests of their owners. Collecting was spurred by economic growth and long-lasting peace. Practically from the Silesian Wars in the mid-18th century until 1945, i.e. for over 200 years, peace prevailed in Lower Silesia. This allowed for accumulation of enormous museum collections in the region.

With the outbreak of World War II those riches found themselves at the mercy of the conquerors, looters, merchants, thieves and common vandals. At the time, Lower Silesia was home to around 60 museums, several hundred private collections held in castles, palaces and villas of rich landowners, factory owners and other wealthy people, and repositories of valuable objects, the so-called hiding places (Pol. skrytka) created by G. Grundmann, heritage conservator in Lower Silesia.

It was a genuine El Dorado, not only for museologists, but for common thieves too. While the former were few, it was quite the contrary with the latter – they were abundant.

The first signs of specialisation of museums appeared at the time. Thousands of exhibits were moved from formerly German small museums to destroyed, plundered museums with small collections situated in central Poland, and museums in large cities, where academic centres were being formed, with the consent (or on the order) of state authorities. The museums in Lower Silesia were taken over by Polish museologists who arrived there from the former eastern regions of the Second Polish Republic, for whom the "German" history of Silesia held no significance or was deemed harmful for the Polish national interest. They often handed over the most valuable collections, which they believed to be useless in a given town, to other institutions. The exhibits lost their historical context. Only those objects were left in place which were directly related to the site stripped of its treasures with lower cultural, material and historical value. This happened with the consent and participation of the central government.

The second round of specialisation of museums in Lower Silesia happened at the hands of the Silesian Museum (formerly the National Museum) in Wrocław in the 1960s. Under the pretext of specialisation, the museum took over from smaller institutions museum exhibits left over after the first round of specialisation. This happened with or without the consent of such smaller institutions. After all, every museum in the region was subordinate to the largest museum of that region and there was no way to defy this.

At that time, museums were established from scratch (in Legnica, Głogów) or started building their own collections (Wałbrzych). With the consent of the Silesian Museum in Wrocław, little museums could exchange exhibits between themselves. Quite often those practices were odd or even harmful for the entire museology of Lower Silesia. The practice continued for a long time and has led to a great confusion, greater even than the one caused by the war and what happened directly after the war. Formerly German museums, with various collections, were supposed to specialise and develop a new identity. The sole names pointed to the kind of objects one could expect to find there, e.g.: Museum of Copper in Legnica, Museum of Mining and Non-Ferrous Metallurgy in Głogów, Museum of Ceramics

in Bolesławiec, Museum of Coal Deposits in Lubań, Museum of Wood Craft in Środa Śląska, Natural Museum in Cieplice Śląskie-Zdrój (it nearly became an Ornithology Museum), Museum of Porcelain in Wałbrzych, Museum of Trading History in Świdnica, Museum of Papermaking in Duszniki-Zdrój, etc. The principal initiator behind those "reformative" ideas, the Silesian Museum in Wrocław, claimed that it was the only museum entitled to amass whatever it liked that pertained to Silesia. Few museums made it through those initiatives and kept their former names and collections, e.g.: Regional Museum in Chojnów, Regional Museum in Jawor, Regional Museum in Jelenia Góra (although there was an idea for a Glass Museum, which was successfully vetoed by local museologists). They managed to keep their old collections to expand them later in various directions, in place of just one established by an official order. Despite all this, for some museums specialisation was either beneficial or it was the only solution to their problem associated with local identity.

31st of March 2017 r. (Friday):

Antoni Stryjewski, Museum of Mineralogy, University of Wrocław

The presence of collections of minerals and other rocks in the 300-year history of academic education in Wrocław

Emperor Leopold I's consent to the establishment of an academic education facility in Wrocław resulted in the foundation of an academy by Jesuits in 1702. Universitas Leopoldina offered a philosophy course as a part of which it lectured in physics and the curriculum included instruction in broadly understood natural science, including Earth science. A privilege issued by Joseph I allowed Jesuits to open in 1707 a pharmacy in the university building which later became famous for its modern features and excellent medications prepared by Jesuit specialists. The first collection of minerals and rocks (probably in the form of a cabinet of curiosities) that served the natural and medical sciences was developed at the time of existence of the Leopoldina university. In philosophy the stones were used to document natural phenomena and to teach students distinguishing between various minerals for the purpose of mining and metallurgy that were developing in Silesia. Antoni Michał Zeplichal is an excellent example to illustrate the approach. In medicine, and pharmacology especially, some minerals and rocks served as ingredients of drugs. This is why the university pharmacy needed to have the medicinal stones and their models, in store. Sadly, the turbulent history of Leopoldina during the Silesian Wars (1740-1763), Prussian occupation of Silesia and the dissolution of the Society of Jesuits (1773) resulted in dispersion, loss or even destruction of the collection.

The next stage of accumulation of stones at Wrocław's alma mater was associated with the transfer of Viadrina university from Frankfurt (Oder) to Wrocław and its unification with the Leopoldina university. Thus, in 1811 Frederick William III founded in Wrocław a new, multi-departmental university which provided instruction in philosophy as well as medicine, which was a branch related with natural science in its broad meaning. The Vratislavia University moved into the building of Leopoldina, and the property of Viadrina was transported on barges up the Oder in 140 boxes. Among other things, those contained collections of minerals. It is not clear what happened with them, as prof. Karl von Raumer, who was entrusted the newly-founded Department of Geology, had to delay the start of his lectures due to unavailability of teaching materials as well as venue. The first historically documented collection of minerals at Wrocław's alma mater was the collection taken over by K.Raumer from the district mining office in Wrocław. K.Raumer deposited the items first in a leased apartment and then in St. Joseph dormitory. He was the one who obtained government funds for the purchase of a private collection of minerals from a mining counsellor Mauder from Freiberg, which was commonly considered to be magnificent. K.Raumer put the exhibits in order and made them available to university teachers and students in the so-called Cabinet of Minerals.

The successor of K.Raumer, prof. Henrik Steffens, enlarged the collection, e.g. by combining it with his own private collection of minerals from Norway. The next successor at the Department, prof. Ernst Friedrich Glocker, was famous for his extensive scientific output, including e.g. discovery of numerous new minerals. Sadly, he took over 16,000 exhibits purchased with public funds during his 20-year reign at the Cabinet of Minerals, to Tübingen where he hoped that they would help him get promoted at the local university.

Prof. Ferdinand Roemer is forever a benefactor of the geology collections of Wrocław's university. He enlarged them by acquiring magnificent private collections and by donating his private exhibits. He also managed to move the collection (1866) to a new building, i.e. the Institute Building located at the junction of Grodzka and Szewska Streets, and turn it into a real museum (1880). Thanks to F.Roemer and his colleagues - prof. M.Websky and dr H.Fiedler, the Museum of Mineralogy of the Royal University of Wrocław became a modern and important institution of research, teaching and museology in the contemporary Germany. F.Roemer published a special guide to make it easier to use the museum collections, where he described each collection of minerals, rocks and fossils.

In 1897, when the department was headed by prof. Carl Hintze, the collections were divided and new research units were formed. Minerals and some rocks remained at the Museum of Mineralogy (the so-called Hintze's collection), while fossils and most rocks were transferred to the Institute of Geology and Paleontology headed by prof. Fritz Frech.

World War II put an end to the existence of Prussian-German Frederick William I University in Wrocław. Its geological collections met the same fate as other teaching and museum collections in Wrocław. They were moved out of the city which was transformed into a fortress and they never made it back in their former state.

In 1945 Polish authorities transformed Wilhelmina into Polish University of Wrocław. Unfortunately, the old museum building was largely destroyed during the war and in such a condition it was handed over to the Faculty of Medicine for a seat of the Department of Pharmacology. A part of recovered collections of stones (43 boxes deposited in Świerzawa) was handed over to institutes of geology and mineralogy temporarily seated in the building of a former machine construction school. A small portion of those was unpacked and used during classes with students. In 1952 the collections were moved to the building at Cybulskiego Street where they have remained to this day. The exhibits were gradually unpacked and catalogued. Some of them were permanently designated for teaching purposes. However, most of them joined the collections of the Museum of Mineralogy and Museum of Geology founded at the Institute of Geological Sciences.

For the collections of stones of Wrocław's alma mater the post-war period brought security, acquisition of new exhibits as well as restoration of the splendour of the collections. Another important individuals who went down in history of the collections included dr Maria Witkiewicz and prof. Michał Sachanbiński (mineralogy collections) and dr Jadwiga Gorczyca-Skała, prof. Jerzy Kłapciński, prof. Tadeusz Gunia, prof. Andrzej Grodzicki and dr Bolesław Wajsprych (geology and paleontology collections).

Sławomir Florjan, The Centre for Natural Science Education in Jagiellonian University

The Centre for Natural Science Education in Jagiellonian University

The Centre for Natural Science Education (CEP) at the Jagiellonian University in Cracow is a recently founded museum and teaching institution. It forms a part of the III Campus of the university at 5 Gronostajowa Street. The activity of CEP is based on scientific collections of exhibits of zoology, anthropology, geology and paleobotany that

were so far held at different university units (Museum of Zoology, Department of Anthropology of the Institute of Zoology, Institute of Geological Sciences and Institute of Botany).

The exhibition section has 2,400 m² and it is composed of two main thematic blocks: geology and zoology plus anthropology. They include a number of smaller thematic blocks, such as: Earth history and history of life on Earth, geological processes, minerals (including a historical collection by Ignacy Domeyko), sedimentary structures, trace fossils, animal systematics, biodiversity of organisms, animal and plant distribution on Earth, adaptation to different environmental conditions, environmental threats and protection, anthropology.

The permanent section of the exhibition includes a block dedicated to the Universe, which serves as an introduction to geology, a large glass aviary with live butterflies and a "Zoology Cabinet of 19th century" which illustrates a study room of a zoologist as it was over 100 years ago. In a separate room there are temporary exhibitions. At the turn of previous and current year there were two exhibitions on display: "A Student in the Tropics", on the occasion of the 10th anniversary of Tropical Ecology course, and "Butterfly Paradise" with the most beautiful insects in the world.

Aside from the exhibition section, CEP has a large and advanced storage space with several large rooms used for storage of scientific collections that were so far distributed between various university units. Like before, the collections of exhibits can be used for scientific, expositional and teaching purposes. In addition, the Centre has classrooms and specialist laboratory and prep rooms for preparation, technical work and tests, including a molecular testing lab.

The construction of CEP was partially financed with EU funds under the Operational Programme: Infrastructure and Environment and a project entitled: "Expansion and modernization of teaching infrastructure for students of exact and natural sciences at the Jagiellonian University" (POIŚ 13.01.00-00-062/08).

Agnieszka Kapuścińska, Tomasz Sulej, Museum of Evolution, Institute of Paleobiology of PAN (Polish Academy of Sciences)

Museum of Evolution - more than just an exhibition

The main sector of the exhibition at the Museum of Evolution, Institute of Paleobiology of PAN (Polish Academy of Sciences) is devoted to the history of terrestrial vertebrates. The exhibition is dominated by dinosaurs from the Gobi Desert brought by the members of the Institute of Paleobiology of PAN in the 1960s-1970s and amphibians and reptiles excavated in Krasiejów. There is also a section devoted to the evolution of mammals and humans and the vertebrate land invasion. For several years now, we have been working on a new exhibition dedicated to marine evolution. The main part of the exhibition is already available to visitors. It includes blocks of rock with fossils from various environments (depths) and prepared fossils from three geologic periods - the Devonian, the Jurassic and the Miocene. All the exhibits come from sites in Poland. Currently we are working on part two of the exhibition which will centre on the course of marine evolution. For many years now, we have been hosting temporary exhibitions, the current one centres on fossils from chemosynthetic ecosystems.

Aside from individual or guided tours, our museum offers research and arts workshops and museology classes. The museum hosts all kinds of para-scientific events, e.g. press conferences, scientific workshops and public debates. Once a month it becomes a meeting place for the members of the Young Paleontologist Club for children aged 6-10. The museum publishes a magazine that popularises paleobiology – Ewolucja.

The Museum of Evolution has marked its presence in the media – television, radio, the Internet. It served as a location for recording television programmes, e.g. Sonda 2. The museum has its own Facebook fanpage and a YouTube channel.

Its presence is marked around the city – the museum has a display cabinet in the Warsaw underground and it is a regular participant of the Science Picnic and the Night of Museums. It cooperates with various private companies that provide it with financial support.

Joanna Grążawska, Historical Museum of the City of Gdańsk Department: Amber Museum

The history and access to the nature collection at the Amber Museum in Gdańsk

In developing the strategy for building a collection of the Amber Museum and its permanent exhibition we drew on the ancient tradition of a museum, a place considered to be a temple and a centre of cultural life, and – according to later interpretations – the meeting place and institution of scientific origin. The Amber Museum, a division of the Historical Museum of the City of Gdańsk, is a local self-governed cultural institution founded in 2000, which has been available to visitors for 10 years. The unique collections are exhibited at the opening of the Royal Road, in the historical building of the gateway to Długa Street. During a visit to the museum one can learn about the history of amber, its properties, acquisition and treatment throughout the ages – from the earliest years to contemporary times. In 2000 the work on the museum collection started from scratch, and in 2006, once the adaptation of the building was done, the permanent exhibition devoted to the history of amber and amber jewellery making was opened. In view of the specific architecture of the historical building which houses the new collection not historically related with the place of exhibition, the content of the exhibition was adjusted to the function of the building. We analysed the experience of other museums that hold amber collections to ensure highest exhibition standards and optimum restoration conditions. Accordingly, we keep the exhibits in temperatures of 18-20 °C and humidity levels of 55-60 %. The analysis of the history of Gdańsk's amber collections in various local collections led to formation of three major departments at our museum: nature, old arts and contemporary craft and design. The division is general as each of the groups of objects is subject to a more detailed content-based qualification. The Amber Museum gathers objects that are unique on the scale of Gdańsk, the region and Poland. Wherever possible, we try to present amber in a wider context, e.g.: by exhibiting various fossil resins or a selection of works by prominent artists from Europe and elsewhere. We acquire new exhibits through purchase, donation or as a deposit. In the past 16 years we managed to accumulate, in all, 2,798 exhibits (as at the end of 2016), i.e. 1,284 items entered into inventory records, and 1,514 entered into the register. There are 1,664 exhibits of nature, i.e. 590 in the records and 1,074 in the register. The Amber Museum entered into a financial partnership with several entities and their contribution to the development of the museum's collection is substantial. We owe a debt of gratitude to our donors. Statistics show that most of the donations come from private individuals. We would like to thank everyone who has contributed to the making of our collection. The museum's collection of objects of nature is divided into several thematic sectors: solids, natural forms, coloured varieties of the Baltic amber, inclusions and fossil resins. The museum has a collection of fossils, we are working on a collection of imitations and amassing objects of iconography. We encourage everyone to see the first part of the exhibition of the Historical Museum of the City of Gdańsk, including some elements of the collection of the Amber Museum, available in a digital format on www.dziedzictwo.pomorze.pl. The exhibits were digitised as a part of the programme "Digital Culture" financed with the funds of the Ministry of Culture and National Heritage in 2016. Every year the Amber Museum is visited by over 60,000 people. The number of visitors since the time of its opening has exceeded half a million. Statistics confirm that it ranks among the most popular museums in Tricity.

Karol Szawaryn, Błażej Bojarski, Muzeum Inkluzji w Bursztynie Uniwersytety Gdańskiego

**The scientific and popularisation aspect of the collection of the Museum of Amber Inclusions
at the University of Gdańsk**

The Museum of Amber Inclusions founded in 1998 operates as a lab facility under the Department of Zoology of Invertebrates and Parasitology at the Faculty of Biology of the University of Gdańsk. The museum was founded thanks to the efforts of scientists and involvement of Gdańsk's amber jewellery makers who wanted to bring the pre-war tradition of collecting and analysing amber specimens back to Gdańsk. The university collection of inclusions constitutes a collection of objects of nature under which materials are prepared for taxonomic analysis and it is a platform for exploration of biodiversity, paleobiology and paleoecology of the Tertiary. The initiator of the foundation of the lab facility was the head of the Department, prof. dr hab. Ryszard Szadziwski, who donated his private collection of 58 pieces of Baltic amber and 5 pieces of Dominican amber with a total of 133 animal and plant inclusions. Throughout 19 years of its operation, the museum accumulated over 5,500 solids with over 14,000 animal inclusions. Considering that nearly the entire collection is made up of exhibits donated by amber jewellery makers, scientists, students and other benefactors in favour of the idea of creating a collection of ambers at the University of Gdańsk, the number is really high. 95% of our collection is made up of invertebrates included in Baltic amber. The remaining percentage are animal inclusions from other taxonomic ranks, plant inclusions and inclusions in other fossil resins.

The main purpose of development of the collection was research. Thanks to the support of the International Amber Association, the Museum has an advanced technical infrastructure designed for amber treatment, which both scientists and students use in their research.

An integral, and most appealing at the same time, part of the Museum is the permanent exhibition: "Life in an Amber Forest". Opened in 2013, the exhibition is a specific compilation of knowledge about amber; it shows its genesis, history, beauty and research value. The principal element of the exhibition is the only in Poland three-dimensional model of an amber forest in a scale of 1:1. The exhibition shows how amber inclusions form - from a liquid resin that forms all kinds of traps for animals and plants, to fossilized solids formed in the course of physical and chemical processes that take place as the resin hardens. Baltic amber inclusions come from the Eocene and they constitute a priceless evidence of life as it was over 40 million years ago.

Alicja Pielińska, Katarzyna Szczepaniak, Adam Pieliński, Michał Kazubski, PAN (Polish Academy of Sciences) Museum of the Earth in Warsaw

Methods of exposition of geology collections in the experience of employees of PAN Museum in Warsaw

The Museum of the Earth in Warsaw, Polish Academy of Sciences, is a geological museum with multiple departments whose collections, composed of 175,000 exhibits, include the objects, accumulated since 1932, of: geology, mineralogy, paleobotany, paleozoology, protection of inanimate nature, as well as amber, meteorites, archives of historical materials about Earth science and a specialist library.

During the construction and modification of permanent exhibitions the authors, employees of the Department of Amber and Department of Collections of Mineralogy and Petrography, having a limited budget, had to analyse the available and useful materials and solutions designed for exposition of exhibits such as minerals, rocks, fossils and ambers. The experience gained from organisation of several dozen travelling exhibitions resulted in photographic documentation of expositions at the visited venues, observation of work practices and proven methods developed by colleagues from other institutions.

This abstract contains a description of several observations regarding primarily the organisation of travelling exhibitions.

In terms of visuals, it is essential for a geology exhibition to include an up-to-date geologic time scale and paleogeographic and/or geologic maps.

Captions in two languages turned out to be a good solution not only in case of exhibitions held abroad - Polish museums also asked for captions with translation into English. It is a good idea to wrap the captions in film or attach them to the base with an adhesive solution. For permanent exhibitions it is recommended to glue them to a thick base / foam.

Framework. In tall/large cabinets it might be necessary to separate off levels to support individual exhibits or groups of smaller exhibits. If there are no shelves, the effect can be achieved by placing glass or plastic panes on properly cut pieces of plastic or cardboard pipes or rolled up cardboard or thick film.

Lighting. If there are no lights inside the cabinets, clear or translucent exhibits should be placed against a background made of a mirror or a shiny film or on a clear base against a white background.

If a magnifying glass with a light for viewing small exhibits and details, e.g. amber inclusions, is unavailable, exhibits should be placed on a clear base against a background made of foil or white paper, which reflects the light from a light source outside the cabinet and illuminates the exhibit.

For conservation reasons, airtight cabinets that guard exhibits against dust and changing humidity levels, are better. Purified water should be used if the inside of the cabinets requires humidifying.

If no publication accompanies the exhibition, there should be communications available at the time of exhibition opening or press conference.

For outdoor exhibitions that illustrate rocks it is an interesting idea to make a cut on the surface of rock blocks and repeat the cut as it weathers so that the visitors can see the structure of the rock.

prof. UAM dr hab. Edward Chwieduk, dr Joanna Jaworska, prof. UAM dr hab. Agata Duczmal-Czernikiewicz, dr Monika Nowak, mgr Anna Popławska-Raszewska, dr Paweł Wolniewicz Museum of the Earth Laboratory, Faculty of Geographical and Geological Sciences in Poznań

Museum of the Earth Laboratory, Faculty of Geographical and Geological Sciences in Poznań

- foundation, activity and collections.

The Museum of the Earth Laboratory at the Faculty of Geographical and Geological Sciences of Adam Mickiewicz University (UAM) in Poznań was officially opened in 2009. It was organised and initially headed by dr Stanisław Koszela. Between July 2013 and August 2016 the laboratory was helmed by dr Joanna Jaworska, and from September 2016 by prof. UAM dr hab. Edward Chwieduk.

The intellectual resources of the laboratory are made up of an active group of volunteers from amongst the employees and students of the Institute of Geology of UAM. The purpose of the laboratory (commonly referred to as the Museum of Earth) is to make available to visitors over 1,500 exhibits of rocks, minerals and fossils, which derive primarily from Poland. The collection is continuously enlarged with exhibits from all over the world and additionally enriched with temporary exhibitions. Undoubtedly, the greatest attraction at the Museum are various-sized pieces of the Morasko meteorite, with the largest in Poland and fourth in Europe exhibit that weights over 261 kg.

In 2012 a lapidarium was opened at the Museum and unofficially divided into four thematic sections: stone in nature, stone in architecture and sculpture, stone in road construction and functional stone. Out of the large group of exhibits, noteworthy pieces include: trunks of black oak which are approximately 2,700 years old, found in Poznań, glacial erratics (100-tonne rock brought from Łęki Wielkie and 25-tonne rock brought from Konin-Józwin Brown Coal Mine, one of three monuments of inanimate nature of this kind in Poznań), and fragments of basalt columns from Ukraine.

The Museum of Earth Laboratory is a university unit, however, it remains open to school and preschool children who are regular guests at the Museum. With this age group in mind the Museum, aside from tours, offers classes and workshops, and conducts social education actions whose aim is to teach participants to recognise rocks, minerals and fossils on historic sites in Poznań, and educate them on the geologic history of Poland and Morasko meteorite. Visit our website: www.muzeumziemi.amu.edu.pl.

Marek Stępisiewicz, Mariusz Niechwedowicz, Museum of Geology, Faculty of Geology, University of Warsaw

**Popularisation of natural sciences as an object of the operation of Stanisław Józef Thugutt Museum of Geology,
Faculty of Geology, University of Warsaw**

Aside from its principal object of operation, i.e. popularisation of Earth sciences: mineralogy, petrography, stratigraphy, paleontology through permanent and temporary exhibitions that illustrate the problems of geological sciences, Stanisław Józef Thugutt Museum of Geology popularises other natural sciences in their broad meaning, including biological sciences and sciences associated with the natural environment (ecology and environmental protection). For this purpose the museum holds numerous temporary exhibitions as well as lectures and workshops during Warsaw's annual science festivals, museum classes and classes for children and teenagers from preschool to secondary school age.

This is attested by the titles of some of the temporary exhibitions from the last several years:

"F(l)ysch from the Carpathians, i.e. Fish (and More) from 30 Million Years Ago", "Time and Plants", "Nature in the Eye of a Geologist - Photographs", "Solnhofen - Myths versus Reality", "Geofascination according to Kozakiewicz... Kazimierz Kozakiewicz", "Square of Mountains - Bis", "The Antarctic: a Research Ground for Polish Scientists", "From Sponges to Long-Nosed Monkeys - a Journey through the Nature of the Malay Archipelago", as well as festival lectures combined with shows, e.g. "Miracles of Evolution - Extraordinary Fossils from 500 Million Years Ago" or "Perfect Eyes, i.e. What Trilobites Saw Millions of Years Ago". Another of such operations include training workshops for kids held during geology festivals: "Fossilized World Millions of Years Ago - Making Impressions in Salt Dough."