On the practical impact of paleontology

Not Just for Art's Sake

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Prof. Marcin Machalski studies ammonites and extinction events during the Late Cretaceous. Between 2007 and 2010, he worked as director of the Evolution Museum at the PAS Institute of Paleobiology. He is the editor of the journal *Cretaceous Research*.

Researchers study fossils for the sake of pure science, because they speak volumes about the world around us and its ancient history. But frequently, such "pure" research yields far wider benefits

Graptolites are a good example of how paleontology can find practical applications. These are ancient colonial planktonic animals with a branched structure; their fragments can be found in shales and mud rocks on the bottom of ancient seabeds. Shale rocks have been receiving a great deal of publicity in recent years due to their gas-bearing properties, and graptolites can be used to date them. It's worth noting that graptolites are a Polish specialty: their relationship with present-day pterobranchia was discovered by Prof. Roman Kozłowski, founder of the PAS Institute of Paleobiology.

Corals and life on Mars

The Institute of Paleobiology also studies present-day and fossil Anthozoa. Using atomic force microscopy (AFM), the team led by Prof. Jarosław Stolarski conducts research into the structure and chemistry of coral skeletons. The main aim of the studies is to elucidate the mechanisms controlling how corals form their skeletons, which in turn is a key to understanding their evolution. An additional goal is to study the complex organic, mineral and nanocomposite nature of these skeletons. This may serve as inspiration for the development of durable materials with applications in medicine (such as bone implants) and even in the arms industry (composite materials used in armature and surface engineering technologies).

Sophisticated analytical technologies are also used by researchers at the PAS Institute of Paleobiology working under Prof. Józef Kaźmierczak. They are studying fossilized microbial structures dating back to the early days of life on our planet. However, the significance of the work is far greater, extending as far as space research. The recent discovery of traces of water on the surface of Mars stirred speculation about whether life could have once existed on the Red Planet. Researchers believe that if it could, its traces are likely to be present in Martian rocks, most likely as fossilized microorganisms. However, their identification may be hindered by geological processes which frequently blur or even erase traces of the biological nature of such objects. Our researchers believe that their experience in studying the earliest signs of life on Earth will one day allow them to make positive identifications of Martian microorganisms.

Dinosaurs and dinoparks

The team led by Prof. Jerzy Dzik from the PAS Institute of Paleobiology and the Faculty of Biology at the University of Warsaw uses simpler but equally effective methods. Field studies are of particular importance in their work. In 1993, Prof. Dzik's team came across an extensive site containing buried fossilized bones of Triassic reptiles and amphibians near Krasiejów in Poland's Silesia region. The most incredible discovery proved to be that of the *Silesaurus*, a relatively small reptile related to ancestors of dinosaurs. Bones of the "dragons of Krasiejów" have since found their way to an exhibition at the Evolution Museum of the PAS Institute of Paleobiology and further afield to pages of international research journals. The site is now home to an extensive science and entertainment center attracting scores of visitors.

Poland's most famous dinopark is located in Bałtów in the Holy Cross Mountains. Its story dates back to 2001, when the paleontologist Gerard Gierliński went on a search of the origins of a folk tale, talking about the imprint of a devil's foo-

A. Kozłowska

Silurian graptolites on the surface of shale; the specimens are a few centimeters long

B. Kremer

A microbial structure, called a stromatolite, from pre-Cambrian rocks in South Africa

tin stone. The discovery turned out to be a trace of a Jurassic dinosaur; it provided an inspiration to create Poland's first dinosaur theme park displaying models of the prehistoric reptiles. This development transformed the area's economic and cultural status.

Numerous other paleontological findings have been made in Poland in recent years, such as the discovery of "the Polish Solnhofen" – a site with beautifully preserved fossils of marine creatures from the Jurassic in Owadów-Brzezinki in central Poland. Dr. Błażej Błażejowski from the PAS Institute of Paleobiology, who is conducting research at the site, is hopeful of further discoveries, as the Earth's deeply concealed mysteries are brought to light.

Rewards in more than name

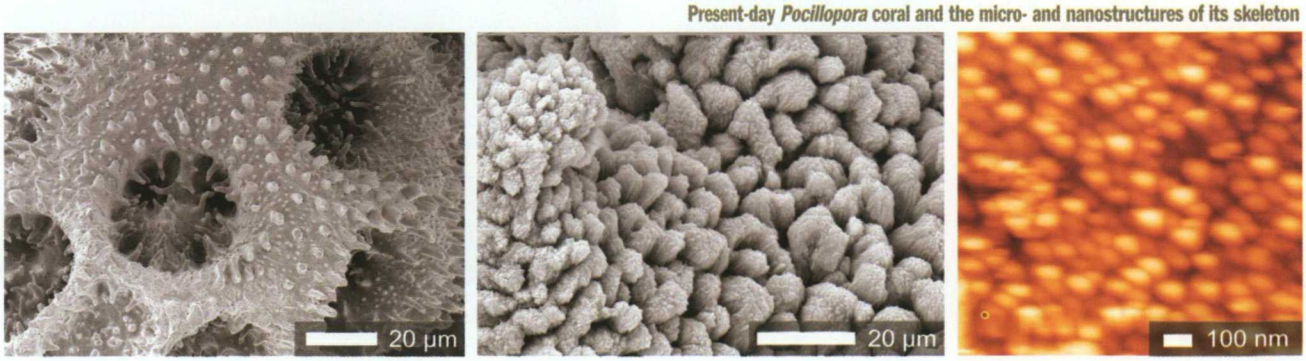
This brief review should make it clear that in paleontology, even the most basic research is far from being just art for the sake of art. Progress here may have an impact on the development of other scientific fields, as diverse as nanotechnology and astrobiology. Paleontological findings can also stimulate the development of geotourism, and as a result support economic and social growth in the regions where they are located. However, be that as it may, it should be noted that all activities aiming to popularize paleontology and geotourism are always rooted in research whose aim is not commercial development but pure science, striving to help us gain a better understanding of the world around us. The level of advancement of this science depends on efforts to ensure the proper level of funding received by researchers and to preserve the autonomy of different types of research conducted by scientific institutions. As with other forms of pure science, therefore, the practical benefits stemming from "impractical" paleontology can be augmented by ensuring the scientific independence of individuals conducting research into "impractical" subjects. ■

Further reading:

Kremer B., Kaźmierczak J. (2006). Perspektywy poszukiwań życia na Marsie [Prospects for the Search for Life on Mars]. *Kosmos, 55, 4,* 365-380.

Podhalańska T. (2013). Graptolity – narzędzie stratygraficzne w rozpoznawaniu stref perspektywicznych dla występowania niekonwencjonalnych złóż węglowodorów [Graptolites – A Stratigraphic Tool for Identifying Promising Areas for Finding Unconventional Deposits of Hydrocarbons]. *Przegląd Geologiczny 61, 8,* 460-467.

Present-day *Pocillopora* coral and the micro- and nanostructures of its skeleton



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