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Professor Milan Herak - on the Occasion of His 80th Birthday

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Milan Herak was born on March 5th, 1917, in Brašljevica, in the area colloquially referred to as Žumberak karst. He grew up in a large family, where good working habits were acquired early in life, and where he benefited from family harmony and mutual support. In his later professional career, as a researcher, team leader, mentor or supervisor, these qualities aided his fostering of a stimulating, creative research environment.

He finished Second Classical High School in Zagreb during which he did not commit himself to any profession. When he was selecting University education, he followed his inclination toward research activity, which was offerred by the then Philosophical Faculty with a combination of several natural sciences.

As a student, Herak was mainly interested in the botanical courses, whereas his close colleague Radovan Domac was more strongly commited to geology, and according to their preferences they divided among themselves the obligations of the lecture notes. During his study, Herak was selected as a demonstrator in the Department of Geology and Palaeontology. This, together with his participation in geological field research led by Professor Salopek, and successfully completed field work in Lika, Paklenica and later on Mt. Medvednica, resulted in geology, (which was not his primary designation), becoming his addiction and thus his professional future. Professor Herak used to comment "...one has not to define his future vocation in the early youth".

After he graduated (1941), he received advance training in palaeontology in Vienna where he obtained his Ph.D., which was based on the palaeontological study of Triassic sponges under the guidance of Professor Julius Pia, who was at that time the most outstanding specialist for fossil algae. Here, besides other things, he had to take nine examinations and to participate in the course of Palaeontology lectured by Kurt Ehrenberg (the son-in-law of Othenio Abel). Despite the fact that, at that time, Abel's palaeobiology was based on neolamarkism, Professor Herak was not influenced by this idea in his subsequent investigations of fossil algae and particularly of the cave bear from Krapina, which was characteristically based on a population approach.

Although he was employed between 1943-1952 with the Geological-Palaeontological Museum in Zagreb, where he was also very active, Professor Herak had already been engaged since 1949 with the University of Zagreb as a part-time Professor. Initially, he taught the new introduced courses of Palaeobotony and Palaeobiology in the Faculty of Science, and lectured basic geology to students of civil engineering and geodesy of the then Technical faculty. For both Palaeobotany and Palaeobiology he utilised his own research experience from his undergraduate and postgraduate training.

In 1952 Professor Herak was appointed assistant professor of the then Technical Faculty. In his notes Professor Herak states that it was not an easy decision for him, because he had planned his future with the Faculty of Science. However, this employment was very useful for geosciences, as very soon Herak founded the independent Department for Geology and Palaeontology. Previously, in the Mining Division of the Technical Faculty there only existed the Department for Mineralogy and Petrology, (headed by Professor Luka Marić) and the Department for Coal Geology and Oil (led by Professor Franjo Ožegović). This was quickly followed by the appointment of the late Dragutin Šikić as Herak's assistant. Besides courses in fundamental geology, Herak initially taught the new course in Engineering Geology with Hydrogeology.

Today, it is quite concievable that engineering geology and hydrogeology are obligatory courses in all branches of geosciences, and a prerequisite for a contemporarely educated geologist. However, in 1952, when Professor Herak commenced to lecture this course, it was in fact named Applied Geology with Hydrogeology. And now, according to his own statement, although he has never been taught in such applicable courses, Professor Herak changed the content of "Applied Geology" into the "Application of Geology".

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At first glance, this may seem a trivial change, or just a semantic trick. However, there is an essential difference. Pasteur once said: "There does not exist a pure (or fundamental) science and the applied science, but there exist only the science and its application, and both of them are mutually related as the fruit tree and its fruits". Although at that time Professor Herak did not know Pasteur's saying, he completely applied it. This shows the identical way of thinking of these two great human beings. Herak had previously obtained practical experience in hydrogeology, first with the late Josip Poljak and later, and to a greater extent, in his individual work on the geological exploration related to the water accumulation in karst areas.

Herak, on the basis of his own experience and additional contemplation of theoretical geological problems, which can have any reflection in practical application, produced comprehensive subject matter for a new course. To be sure, the precise consideration of separate concrete problems of quantification, i.e., the measurements, are nowadays obligatorily required, but without geological ideas in terms of what, where and why to measure, the quantification becomes and remains the purpose for itself. In another words, as Professor Herak used to say, the karst hydrogeology, including the morphology, can be understood only if the geology and structure of the terrain are known. It means that the first approach in karst exploration must be tectogenetic and not purely "geomorphological" and descriptive, as was the case with earlier researchers.

Consequently, from 1952-1959, when Professor Herak left the Technical Faculty and accepted the professor's position at the Faculty of Sciences, he was teaching Engineering geology with Hydrogeology (besides courses in fundamental geology) in the Technical Faculty, and Palaeobotany in the Faculty of Sciences. It is hard to conceive two more heterogeneous courses, and even geoscientific disciplines, which can be successfully realized by one person and teacher.

Very soon after his appointment to the Faculty of Sciences, Herak became the active chairman (1959-1974) of the Department of Geology and Palaeontology of the Faculty of Sciences, and in 1960 he was elected full professor. He was continuously teaching in the Technical faculty, as a part-time professor until the introduction of a younger successor.

Throughout his prevailing geological occupation, Professor Milan Herak has published about 220 different bibliographic units, which include about 100 scientific papers, 13 editions of text-books in geology and palaeontology, the author's edition "General account of the Earth", and the international handbook "Karst", published by Elsevier (1972). The thematic span of his papers is very broad and are equally distributed between domestic and international journals.

This broad field of vision is characteristic not only of his research and scientific activity but also of his teaching work. His teaching method relies on building upon a good foundation of knowledge, adding specialist techniques in order to obtain results. Knowing how to apply the geology is the tool which we learned from him to utilise in understanding complex geological occurrences, and to show that they can be explained in a simple and understandable manner. He convinced us that field research must be based on a concept which should be checked by observations. When the geological processes do not fit into the concept and thus cannot be explained, then the concept should be changed; this was Professor Herak's guiding principle.

Generally, and as a rule, at undergraduate level Professor Herak was lecturing standard courses (e.g. general geology, stratigraphy), gradually passing them to the younger teachers as he founded new courses, as exemplified by Karst Geology.

Before his professorship in the Technical Faculty, Professor Herak, together with late Professor Miroslav Tajder, wrote the geological part of their joint university text-book "Petrography and geology", that was intended for students of Agriculture and Forestry. This handbook ran through four editions (1951, 1959, 1966 and 1972), further editions were only prevented by Professor Tajder's decease. Also during his employment with the Museum, Professor Herak started to write a handbook on Palaeobotany, because he took too seriously the official suggestion, prevailent at that time, that each course should be covered by a corresponding text-book. However, whatever the reasons, after the initial publishing difficulties with "Školska knjiga", this book ran for two editions (1953 and 1963) and the book was also received in Ljubljana and Belgrade. The strongest influence for many generations of students of geology was, and still is today, though to a lesser extent, Professor Herak's comprehensive book on the whole subject of geology (structure, geodynamics, stratigraphy and regional geology of the Earth), which ran through five editions (1960, 1973, 1984, 1987, 1990). This was, and still is, for the time being, the first and the only comprehensive text- and handbook in geology in the University of Zagreb. It would be desirable and in the interests of geology, as an integral natural science, that we have more textbooks for separate geological disciplines, and Professor Herak's book will always represent a "lighthouse", in this direction, the first step which "broke the ice". (This refers to the geology in the strict sense, for there are text-books on mineralogy, petrography, etc.)

In modern university education more and more significance is focused on post-graduate studies. This is quite understandable due to the tremendous progress and branching of the natural sciences, including geology. Professor Herak was the founder and the first leader of Post-graduate Study in Geology at the University of Zagreb and he is still included in its activity.

Perhaps his most important, and most lasting (or even "selfreproducing") contribution to geology in Croatia, is Professor Herak's activity in guiding and pushing forward young scientists. He was the mentor for 16 doctoral theses and many more masters theses. The range of his students covered all branches of geology,

from palaeontology to hydrogeology. Thus he set firm foundations for continuous activity in numerous geological disciplines, which he initiated by his own research. It should be mentioned, as a fact of special importance, that Herak's doctor's and master's candidates came not only from Croatia but also - 5 or 6 of them - from Bosnia and Hercegovina, which considerably promoted both Herak's personal influence and the influence of Zagreb geological school in that country.

For his many-faceted and very fruitful activity, Professor Herak was honoured with numerous credits. He is a correspondent member (from 1963) and a full member of the Croatian Academy of Sciences and Arts. He was also its vicepresident (1975-1978), the secretary of its Department for Natural Sciences (1986-1988), the member of its presidency, editor-in-chief of its journals "Acta geologica" and "Karst of Yugoslavia" and the leader of its Committee for Karst and Committee for Geotectonics. He is also a member of the Austrian (since 1977), and Slovenian Academy (since 1977), and he was also a member of the Serbian Academy of Sciences until 1991, when he cancelled this membership. He is a member of the Geological Society of Croatia, was its first secretary and afterwards its president and honorary member. He is a member of numerous international societies. He was awarded the "Ruđer Bošković" prize (1968), the prize for the life deed (1976) and the commemorative medal of Zagreb city (1965). He was awarded by the Orden of work with a golden wreath (1961) and by the Orden for the working people merit with golden star (1986).

As a symbol of the significance of his scientific and research activity, numerous authors honoured Professor Herak by the nomination of new taxa based on his name. These are for the most part fossil calcareous algae, i.e. in his greatest and most easily recognizable palaeontological research activity.

The Croatian geologists, including his numerous students, organized a scientific meeting on March 5th, 1997, on the 80th anniversary of his life, paying tribute to Professor Herak and giving him credit for his teaching, professional, and scientific activity. As a lasting record of this event, the content of the scientific meeting is now issued as a separate volume of Geologia Croatica.