

A VISIT TO SOCENI (BANAT, ROMANIA) – REMEMBERING ERICH JEKELIUS (1889-1970)

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Abstract. Soceni is an important fossiliferous site in Central Europe which documents the Middle Miocene development of the Central Paratethys Sea and the formation of Lake Pannon during the Late Miocene. The site is especially famous due to the palaeontological study on molluscs by Erich Jekelius during 1930–1940. A visit to Soceni in 2006 allowed us to examine Sarmatian and Pannonian sediments and collect fossil material. We remained impressed by Erich Jekelius' work and here we briefly present the scientific personality and achievements of this extraordinary geologist. We will explain why Jekelius investigations at Soceni are still valuable for the ongoing palaeontological research nowadays.

Key words. Soceni (Banat), Palaeontology, Sarmatian, Pannonian sediments, molluscs

INTRODUCTION

The village Soceni lays in the Caraş-Severin county at about 10 km north from Reşita and 25 km west from Caransebeş. At the end of the 19th century the Hungarian palaeontologist Halaváts took samples from the nearby valley Turislav (Halaváts, 1893; 1894), recognising its stratigraphical importance. Later on the Hungarian palaeontologist Imre Lörenthey noted that some of the molluscs from Soceni, dated as Middle Miocene (the Sarmatian) had affinities with those from Budapest (Lörenthey, 1903). A series of expeditions to Soceni resulted in a long lasting discussion about the evolution of the fauna from this locality.

During 1930 and 1940, Erich Jekelius sampled intensively the fossil molluscs from Soceni, namely, from the Turislav valley and the nearby valley of Poliţioană. Finally, in 1944, he published an impressive monograph "Sarmat und Pont von Soceni (Banat)", which has 167 pages, 65 photographic plates and covers information on about 100,000 fossil specimens of

molluscs, belonging to more than 200 species and subspecies. Many specialists, *inter alia* Adolf Papp (*in Papp et al.*, 1985), consider Jekelius' work a milestone in the description of the Miocene molluscs from Central Europe. Harzhauser & Mandic (2004) noted that "the synoptic presentations of Jekelius, 1944, continue to serve as the foundation stone of our knowledge on the mollusc fauna of early Lake Pannon."

We visited Soceni and the outcrops of the Poliţioană and Turislav valleys, during September 2006. We could recover fossil molluscs and ostracods and remained impressed by the field description of Jekelius and, of course, by the excellent way of the presentation of the fossil material in his monograph. We asked how it was possible for Jekelius to complete such an extensive and diverse scientific programme. Below we will briefly deal with this subject and finally we will show the importance for the new generation of palaeontologists the principles of research used by Jekelius at Soceni when integrated within a pluralistic scientific framework.

ERICH JEKELIUS – GEOLOGIST, GENEALOGIST, BENEFACTOR

To better understand why Jekelius decided to work at Soceni and how he developed his palaeontological research programme we will offer first, information on his education, on his professional activity and on his interests for social activities, especially those dealing with the German community from Transylvania.

Erich Jekelius belongs to an old and wealthy family of “Siebenbürger Sachsen”, the German community from Transylvania (in Romanian called “Sași”). Members of his family were Protestants, already mentioned in the 16th century in Transylvania. Erich Jekelius was born 1889 in the village Langendorf (Satul Lung), now incorporated in the locality Săcele, near Braşov. He received from the very beginning a solid education and studied at the famous college Honterus in Braşov. Afterwards, he started in Strasbourg to study geology, continuing in Germany at the University of Leipzig and finished his studies with a doctoral thesis (1914), in Budapest (Prox, 1969)*. The subject of his thesis dealt with the Mesozoic (Jurassic) fauna from the Bucegi and Ciucaş mountains, located close to Braşov in the Carpathians. Several publications arose from the data of the doctoral thesis (cf. Jekelius, 1916).

Jekelius was first appointed as geologist, during 1916–1919, at the Hungarian Geological Institute in Budapest. Later on, he spares no effort working at the Institute of Geology in Bucharest until 1944. With Romanian colleagues he mapped coal, earth gas and minerals, like opal. He produced tectonic maps or simply general geologic regional studies for various parts of Transylvania and the southern Carpathians (e.g. Jekelius, 1923, 1924; Mrzecz & Jekelius, 1927). In the same time, Jekelius was interested in the palaeontology of the Pliocene of the Baraolt Basin. He studied thoroughly the molluscs of this area and beginning of 1930 published a monumental monographic study (Jekelius, 1932) which is still a useful compendium for comparative studies of fossil ancient lakes (Harzhauser & Mandic, 2008).

One of the perennial problems of the Tertiary palaeontology in the Central and South-Eastern Europe was the stratigraphic (age) correlation at a regional level, namely to correlate the fossiliferous profiles dated as Miocene (Sarmatian) and post-Sarmatian from Eastern Europe, viz. Eastern Romania, Russia, with those of Central Europe in Hungary, Austria and of course in South-Western Romania (Banat). Jekelius who had contacts with Hungarian and Austrian colleagues (he was a member of the Austrian Geological Society already in 1930), wrote two studies dealing with stratigraphic correlations of Miocene sedimentary deposits between the Eastern and Central Europe (Jekelius, 1935; 1943). During 1930–1940, he investigated intensively many fossiliferous sections at Soceni, on which he published (1944) an ample monograph,

* A complete list of Jekelius' publications is provided by Şerban Dragomirescu (MS in preparation).

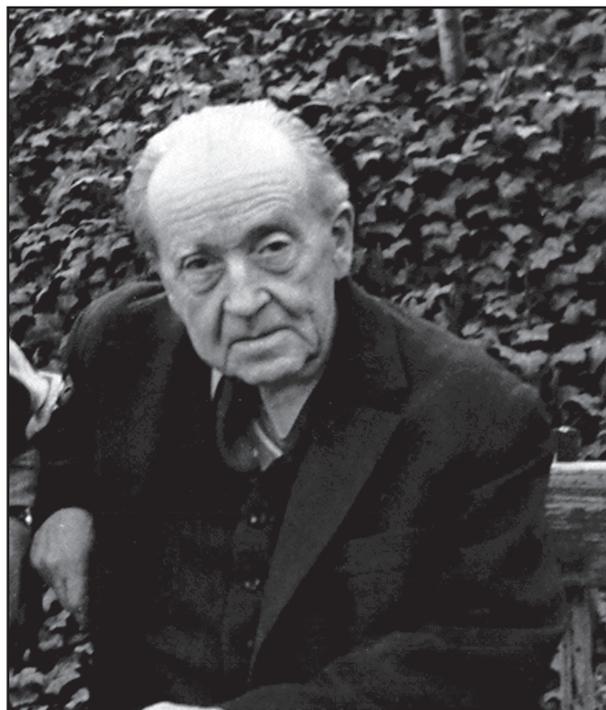


Fig. 1 Erich Jekelius in 1963
(from the Photo-archive Monika Jekelius, with permission)

“Sarmat und Pont von Soceni (Banat)”. The special importance of this seminal work will be presented in the next section.

With the dramatic political changes in Romania after 1944, Jekelius left the Institute of Geology in Bucharest, spent some time in Vienna, returned to Romania and lived out-of-the way with his family in Transylvania between 1945 and 1949 (Margarete Jekelius, pers. comm. to D. L. D.). At the beginning of 1950, he returned to Bucharest and worked within an applied-research institute (Institutul de Studii și Proiectări Energetice) where he provided his expertise on the geology of potential areas for hydroelectric power-plants. In 1956, Jekelius was appointed chief of the palaeontological department of the renewed Institute of Speleology in Bucharest (Negrea, 2007). This latter organisation is the famous institution for cave biology research founded at Cluj in 1920 by Emil G. Racovitza. During this period Jekelius published several geological papers dealing with the hydrology of the karstic area between the Iad and the Drăgan valleys in Transylvania (e.g. Jekelius, 1964). He retired in 1961 and settled in Braşov until 1967 when he left Romania for ever. He died 1970 in Bissingen/Enz (Baden-Württemberg, Germany).

Erich Jekelius, beside his professional activity as geologist, participated also to the social life of the Transylvanian German community in Braşov. He was a member of the “Burzenländer Sächsisches Museum” (in Romanian, Muzeul Saşilor din Țara Bârsei), located in Braşov, where he published and/or edited books dealing with the history of the German community from this part of Transylvania (e.g. Jekelius, 1928,

1929). He became, in 1936, the director of this institution and sponsored various cultural activities (Prox, 1969). Another important social activity of Jekelius was the investigation of the genealogies of the Transylvanian German families. An impressive catalogue of genealogic data was developed by Jekelius covering the history of more than 300 families. An activity which is still today much appreciated by many Germans who can recognise their deep roots in Transylvania (Prox, 1969).

Summing up, Jekelius was a remarkable geologist with an extended professional education. He was a humanist with a deep knowledge of the history of Transylvania, especially of his beloved Burzenland (Țara Bârsei) and of the "Siebenbürgisch-sächsische" community. We will see below that some qualities of Jekelius' personality herein mentioned help to understand why and how this scientist completed the "Soceni Project".

THE "MYSTERY OF SOCENI" AND THE JEKELIUS' SOLUTION

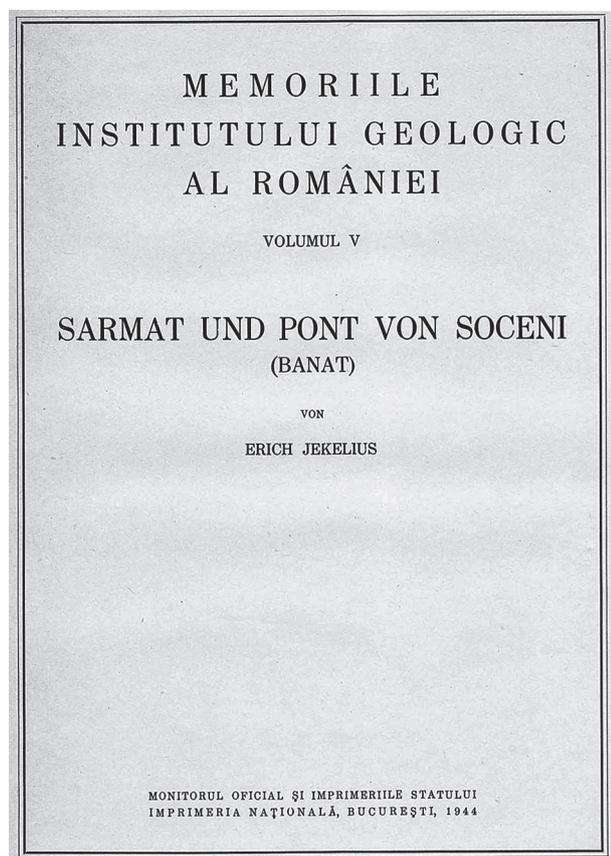


Fig. 2 Front-page of the Erich Jekelius' monograph "Sarmat und Pont von Soceni (Banat)"

To better understand the enormous work of Erich Jekelius at Soceni and especially the meaning of his scientific effort we have to place this locality within the palaeontologic context. Specifically, during the past 30 Ma a sea which extended from the Indo-Pacific Ocean towards the Western Mediter-

anean, the Paratethys, formed a structured biogeographic entity which changed steadily during the "deep time". Its palaeogeographic reconstruction, including regional faunal correlations, was subject of studies for several generations of palaeontologists since the 19th century. One should mention inter alia the series of cooperative studies initiated by Adolf Papp for the Paratethys and published since the 1960ies in the series "Chronostratigraphie und Neostatotypen, Miozän der Zentralen Paratethys" (for the case discussed below two volumes are of relevance, the "M5 Sarmatien" edited by Jan Seneš (1974) and the "M6 Pannonien, edited by Papp *et al.* (1985). Afterwards, a series of synthetic palaeogeographic and palinspastic maps were published (*e.g.* Rögl & Steininger, 1983). The reconstruction of the Paratethys-Sea history, pointed out to the evolution of three basins: a) an Eastern Paratethys, covering areas where the Aral, the Caspian, the Black Sea and the lower Danube plain nowadays exist; b) a Central Paratethys, including the basins of the Eastern Alpine-Carpathian Foreland ranging from Lower Austria to Moldavia and the Pannonian Basin System; c) the Western Paratethys, which comprises the Alpine Foreland basins of Upper Austria, Southern Germany, parts of Switzerland and Southern France (Piller *et al.* 2007).

Due to the tectonic evolution of the Alpine-Carpathian mountain system, the Central Paratethys slowly evolved from a purely marine environment with normal salinity into a brackish-water one as well as into hypersaline ones and finally terminated in a series of ancient freshwater palaeo-lakes (Harzhauser & Mandic, 2008). During these terminal phases of restrictions from the open oceans, a series of endemic faunas developed. Eduard Suess (1866) coined the term "Sarmatian Stage" for the first fully endemic phase of the Central Paratethys during a rather short period of time, now evaluated to be between 12.7 Ma and 11.5 Ma before present (Piller & Harzhauser, 2005; Harzhauser & Piller, 2004). After this period, the marine environment switched into a limnic one. The sea vanished and the huge Lake Pannon formed for several million years, *i.e.*, until 5.8 Ma before present (Harzhauser & Mandic, 2008). In the Eastern Paratethys domain the so-called "Sarmatian Stage", characterised by fluctuating salinities and aberrant water chemistry, persisted during a longer period of time, as compared to the Central Paratethys, causing confusion in stratigraphic correlations (*cf.* discussion in Papp, 1974; Papp *et al.*, 1974).

At the end of the 19th century, many palaeontologists were partisans of Charles Lyell's ideas presented in his famous "Principles of Geology" (Lyell, 1842), that is, the steady gradual changes of the earth's environment, an idea which was also part of Charles Darwin theory of evolution (Gould, 2002). This latter author notes that Lyell's argument was more rhetoric than empirically demonstrated, therefore at the time, palaeontologists were eager to find uncontroversial sites where such continuous (gradual) evolutionary series could be seen. Here starts the "Soceni story" as it is recounted by Jekelius (1944).

During 1881-1882, the Hungarian palaeontologist Gyula Halaváts studied the fossil molluscs from Soceni and found beside typical Lake Pannon faunas with representatives such as *Melanopsis vindobonensis* Fuchs, "*Pleurothoma kochi*" Fuchs, *Congeria* sp., also a specimen of "*Tynnyea vasarehlyi*", a species, which was known from the Sarmatian layers near Budapest, at Tynnye. The palaeontologist Imre Lörenthey from the University of Budapest was sceptical of Halaváts' correct identification of the *Tynnyea* and sent one of his young students, Viktor Aradi, to resample the fossiliferous sections of Soceni. Aradi took samples from the outcrops of two valleys, the Turislav and Polițioană, and produced an integrated stratigraphic profile with the mollusc faunas he identified. He presented to Lörenthey a complete gradual change of the quantitative and qualitative species spectrum going from a reduced marine assemblage to a limnic freshwater one. Without visiting Soceni, Lörenthey published (1903) Aradi's data in a paper named "Ein klassischer Fundort der die sarmatischen und pannonischen Bildungen überbrückenden Schichten in Ungarn". The publication stirred much scientific interest during the next period. The malacologist Nikolai Andrusov came to Budapest to examine the specimens, especially the dreissenids, collected by Aradi and was not completely convinced by the arguments of Lörenthey (Andrusov, 1910). However, the Soceni profile as an example for a gradualistic change of the mollusc spectrum was further mentioned or discussed (Lörenthey, 1911; Schreter, 1912; Laskarev, 1924). Commentaries continued during the next two decades with arguments on the correlation of Sarmatian and post-Sarmatian layers from the Central Paratethys with those from the Eastern Paratethys domain. Jekelius participated to such studies with two publications (Jekelius, 1935, 1943). The French specialist Suzette Gillet published her studies about the Miocene-Pliocene molluscs from Eastern Romania and compared them to the data from Banat (Gillet, 1932; 1933; 1938; 1943). Jekelius noticed many discrepancies between Gillet's data (who mentioned also Soceni) and his own observations. All this debate on the Soceni stratigraphy and mollusc fauna apparently stimulated Jekelius to undertake an in-depth palaeontological study of the two relevant areas, the Turislav and the Polițioană valleys.

Jekelius documented in an uncontroversial way the misconduct of Aradi. In his monograph (1944), he showed that Aradi in order to get the gradual change of fauna, mixed the information from both valleys to construct a single profile. Jekelius pointed out also that possibly Lörenthey noticed this situation but had not the force to retract his views, in other words, failed for scientific integrity. More interestingly, on examining other publications of Aradi, Jekelius noticed similar counterfeits and gave a sociological explanation for them, particularly, the ambition of Aradi, as young scientist, to accede to high scientific recognition. Such circumstances occur, unfortunately, nowadays too but it seems that at the time, Jekelius was a pioneer in the studies of ethical misconduct and its causes.

Jekelius reacted to the dubious faunal identification from Soceni provided by Gillet with a detailed morphologic and taxonomic study of both gastropods and lamellibranches. A total of 102,257 specimens were identified. They belong to 113 species and subspecies from the Turislav valley and to 140 species and subspecies from the Polițioană valley. A careful sedimentary description of the sites sampled by Jekelius combined with the identification of the fauna led this author to the conclusion that at Soceni one can see a clear Sarmatian fauna on which post-Sarmatian fauna without gradual transition exists that he dates as Pontian (now treated as Lower Pannonian). He discussed also the "lower *Congeria* layers", which are important arguments for chronostratigraphic correlations at other sites. In the case of Soceni, he shows that it is very doubtful that someone could use them for exact age correlation and stratigraphic classification.

The marine Sarmatian facies at Soceni, separated from the lacustrine Pannonian one is documented by Jekelius not only with taxonomic data but also with palaeo-ecological and palaeobiological arguments derived from the sampled fauna. He showed that in the Polițioană valley one finds an assemblage with marine Mediterranean elements. He documented that only in Sarmatian layers one finds gastropods and lamellibranches with holes due to predatory marine molluscs. Finally, he used the argument of miniaturisation of gastropods as observed in Recent brackish marine waters. The observation for the Baltic Sea of Remane (1934) as well as the fossil data of Papp (1939) are mentioned by Jekelius.

At last, we have to mention that Jekelius in his malacological studies of Soceni took in consideration the whole size-spectrum of the fauna, specifically, he described the much neglected minute species and even paid attention to the phenotypic variability of various taxa. In this way the monographic study of Jekelius solves in an uncontroversial way the "Mystery of Soceni!". We will see below that Jekelius' monograph remains very present and deserves further examination by any palaeontologist dealing with similar topics.

ERICH JEKELIUS RESEARCH PROGRAMME – AN APPEAL FOR STRONGER SCIENTIFIC PLURALISM

After the visit of Soceni in 2006 and the careful examination of Jekelius' monograph some of us remained perplexed by the tremendous work and energy invested in this project. Moreover we see that even nowadays Soceni is a palaeontological reference site and remains a scientific attraction. Therefore the communal authorities decided to delineate in the two valleys, Turislav and Polițioană, a natural reserve called "Rezervația paleontologică de la Soceni", intended to protect the rich fossiliferous sections (Rezervații și parcuri naturale, 2009). One of the most rewarding facts for a scientist is to see that after more than 60 years other scientists still refer to the work he had produced. So it is maybe useful, especially for young palaeontologists, who want to develop innovative research projects, to enumerate here some of the

aspects which explain the extraordinary success of Jekelius research programme at Soceni:

(1) Jekelius through his education was a real European personality. He was at ease within his German Transylvanian community as well as with people from southern or western part of Romania, with colleagues and friends from Austria, France, Hungary, and Germany. He could communicate his ideas in several languages with facility and charm (Ionel Tabacaru, pers. comm. to D. L. D.).

(2) Jekelius chose to settle his project within the framework of the hot topics of the regional stratigraphic correlations of the Sarmatian and the post-Sarmatian (Pannonian-Pontian) in Europe. This research tradition (*sensu* Laudan, 1977) is still an active debated subject (*cf. inter alia*, Papp, 1974; Papp *et al.*, 1985; Kováč *et al.*, 2004; Harzhauser *et al.*, 2004; Olteanu, 2003; Olteanu & Jipa, 2006; Piller *et al.*, 2007).

(3) The success of the Soceni programme is due to the in-depth examination of the mollusc fauna. In the Turislav valley, Jekelius sampled the molluscs from more than 100 kg sediment. He catalogued an immense number of individuals and carefully studied them taxonomically. He examined for the first time the minute specimens, which were completely unusual for the malacological research during those years. One could say that for the Soceni success, and in our opinion one should say for any good research project, the dictum "God is in the details" applies.

(4) The way the misconduct of a palaeontologist (the case Viktor Aradi) is documented in the Jekelius' monograph and how the sloppy research of other specialists is documented is a beautiful expression of the moral duty of a scientist to defend the truth, respectively to keep scientific integrity as the highest priority.

(5) One is impressed by the field work and by the masterful documentation of the fauna of Soceni. Both aspects were bound to financial aspects. One can see that Jekelius was not only a hard planner and worker of the project, but also a successful fund-raiser for printing costs of his monograph. Several oil companies which operated during that time the Banat, covered these costs and enabled the extensive photographic documentation of the Soceni molluscs (Jekelius, 1944).

(6) One can appreciate objectively the scientific progress brought by the Soceni project from the amount of information presented in the Jekelius' monograph. This demonstrates that in Banat the Sarmatian was still a marine environment and could be well delineated from the later period of the Pannonian. The data of Jekelius are nowadays fully corroborated by new evidence (*cf.* Piller & Harzhauser, 2005).

(7) We are living in a time where cooperative work is more efficient than one-man production. We recently advocated (Danielopol *et al.*, 2008) the necessity to intensify the multi-

disciplinary studies within a bright collaborative way. For this type of work we need a pluralisation of both biology and palaeontology, particularly, to increase our effort for the education of students, that is, on one side to prepare them to keep an open eye for the wide variety of interesting geological topics, on the other side to specialise acquiring a deep knowledge on specific topics. The former quality helps to communicate and to integrate in dynamic working-groups, the latter one offers the necessary know-how for obtaining solutions to the topic in discussion. Jekelius had both qualities and we should follow his example!

(8) There is in any dedicated scientist a permanent search for what one should call "the un-ended quest for truth". In his monograph of Soceni, Jekelius mentioned that, even if his monographic treatment of molluscs was very exhaustive, he considered necessary to expand in the future the investigations visiting the mollusc collections of Central Europe for comparison of his material with the original type material or, if necessary, to revise the old data. He did not any more achieve this idea because of the historical period in which he lived after the Second World War but others embraced his idea and followed his way of thinking. This is the spirit in which we visited Soceni in 2006. Some of the material sampled in Soceni was used successfully by our working-group for new studies on the Central Paratethys and the Lake Pannon (Danielopol *et al.*, 2008; Mayrhofer *et al.*, 2009).

ACKNOWLEDGEMENTS

We are indebted to Mr. Şerban Dragomirescu (Bucharest) who invited us to contribute to the "Erich Jekelius Symposium" organised in Braşov (23 October 2009) and also for various useful information. Our sincere debt goes also to the Austrian Academy of Sciences (Vienna) and the Romanian Academy (Bucharest) which through their cooperative scientific exchange programme made possible our expedition to Soceni, September 2006. Professor Mircea Săndulescu (Academia Română), Drs. Titus Brustur, Dan Jipa and Radu Olteanu (GeoEcoMar, Bucharest) helped with the logistics of our research in Soceni. Dr. T. Brustur is also thanked for his generous donation of the monographs of Jekelius to one of us (D. L. D.). Additionally, we are much indebted to those who offered information on Erich Jekelius: Margarete Jekelius (Rottweil), Mag. Monika Jekelius (Tübingen), Georg Coulin (Augsburg), Dr. Ionel Tabacaru, Dr. Radu Olteanu and Professor Dr. Marcian Bleahu (Bucharest). Dr. Sanda Iepure (Institute of Speleology "E. G. Racovitza", Cluj) helped during the sampling campaign. This contribution is a spinoff to the project P 17738-B03 (FWF) attributed to D. L. D. and this latter acknowledges the Austrian Science Fund. Finally, Mrs. Cristina Poenaru and Mr. Nicolae Panin (GeoEcoMar) are thanked for editorial help.

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