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Eighty-fifth Anniversary of the Birth of Professor Krzysztof Birkenmajer

This volume of *Annales Societatis Geologorum Poloniae* is dedicated on the occasion of his 85th birthday to Krzysztof Birkenmajer, an illustrious Polish geologist and explorer, who devoted his life to the search for the truths preserved in the rock record. An eminent figure in world-wide geology and polar exploration, with more than 66 years of scientific activity, documented in over 600 scientific papers, books, and tens of geological maps and cross-sections, Krzysztof Birkenmajer is known to his co-workers and pupils as Professor Birkenmajer. His major accomplishments in a wide variety of fields include polar exploration, stratigraphic and regional studies of the Alpide mountain belt, and cartographic work, problems in magmatic rocks, and in particular his contributions to the understanding and reconstruction of the evolution of the Pieniny Klippen Belt (West Carpathians), perhaps the most complicated geological structure of Europe, are milestones in world geology.

Professor Birkenmajer was born on October 6, 1929, in Warszawa, Poland. He was raised in a family with a long patriotic tradition. His forefathers include Antoni Karol Birkenmayr (1778–1830), a soldier under General Dąbrowski and Prince Poniatowski during the Napoleonic epoch; Bernard Birkenmayr (1819–1894), a trooper under General Bem during the Hungarian Uprising (1830–1831); Alfred Józef Birkenmajer (1892–1977), a gunner in the Polish Legions during the First World War, a soldier during the Polish-Soviet War in 1920, in the 3rd Silesian Uprising in 1921, and the Second World War; and Aleksander Ludwik Birkenmajer (1890–1967) who refused to sign the *Reichslist* during his internment in the German concentration camp at Sachsenhausen, where he was held by the Germans after the infamous *Sonderaktion Krakau*. Professor Birkenmajer's father, Józef Antoni (1897–1939), like so many Poles, followed a road that included Siberia, as an Austro-Hungarian soldier in Russian captivity during 1916–1918, then as a volunteer in the famous 5th Polish Siberian Division (1918–1920), and as a refugee from Soviet captivity (1920), only to fall in battle defending Warszawa against the German invaders in September, 1939.

A characteristic feature that Professor Birkenmajer inherited from his ancestors is exceptional skill in science. His grandfather, Ludwik Antoni (1855–1929), a professor at the Jagiellonian University and the Director of its Astronomical Observatory, was the first Polish geophysicist, known not only for fundamental research in gravimetry, but also famous for his pioneering studies on the thermal systems of lakes of the Tatra Mts.; he was also an outstanding historian, devoted to the biography of Nicolaus Copernicus. Aleksander Ludwik, his uncle, a historian of science, was a professor at the Jagiellonian University and the Director of the Jagiellonian Library, Kraków, and Poznań University Library. His father, Józef Antoni, a poet, writer and translator was an expert in Old Polish literature, as for example the author of a monograph on "Bogurodzica", the oldest Polish song, and also famous for his unmatched translations of such classic books as Rudyard Kipling's "The Jungle Book", Daniel Defoe's "Robinson Crusoe" and Robert Louis Stevenson's "Treasure Island".

Professor Krzysztof Birkenmajer in the Pieniny Mountains (Szczawnica, summer 2001)

It is no wonder that Professor Birkenmajer made his life motto *Pro patria et scientia*, having such forefathers and being raised in such an intellectual atmosphere.

From his boyhood, Krzysztof Birkenmajer had been fascinated with nature and excited by stories of exotic journeys and exploration. The development of these interests was cut short by German hostilities against Poland and the start of World War Two in September, 1939. The Professor

Professor Krzysztof Birkenmajer in the Pieniny Mountains (Flaki Ridge, summer 2001)

frequently recalled his return from the summer holidays in the first days of September, when he was travelling with a knapsack full of fossils from Złoty Potok (a village in the northern part of the Kraków-Częstochowa Jura, where there are numerous exposures of fossiliferous Oxfordian limestone) to his hometown of Warszawa in a train crowded with refugees fleeing from the German armies. During the occupation, education was banned by the Germans and Krzysztof Birkenmajer could only attend classes in secret. He was in the scouts, engaged in the resistance movement of the Home Army (*Armia Krajowa*) and involved in the preparations for the Warszawa Uprising. The outbreak of the uprising on August 1, 1944, found 15-year-old Krzysztof Birkenmajer outside of Warszawa; his attempts to join his fighting colleagues had failed and he decided to rescue his younger siblings by moving them along the front line to Kraków, where he came in the autumn of 1944. After the war, he decided to continue his education by taking classes in geology and palaeontology at the Jagiellonian University in Kraków. The courses started in 1947 and as a young student Krzysztof Birkenmajer soon showed great enthusiasm and diligence, features that distinguish him to this day, by preparing in 1949 a manual, titled "*Tabele stratygraficzne*" (Stratigraphic Tables) for geology students. Having the opportunity to study under such prominent Polish geologists as Marian Książkiewicz, Stanisław Siedlecki, Jan Czarnocki and Stanisław Sokołowski, he soon undertook his own individual studies. In particular, Stanisław Siedlecki, geologist, alpinist and eminent polar explorer, influenced the later interests of Professor Birkenmajer.

Professor Birkenmajer's adventure with science got off to a good start in 1949, when he started geological investigations under the guidance of Stanisław Sokołowski in connection with the dam planned at Czorsztyn, in the Pieniny Mts. Soon after, in 1950, Krzysztof Birkenmajer graduated after presenting his Master of Science dissertation on the freshwater Neogene deposits of Orawa, Podhale and the Pieniny Mts. (Carpathians), supervised by Marian Książkiewicz and Władysław Szafer. A part of his thesis, published in *Rocznik Polskiego Towarzystwa Geologicznego* (now *Annales Societatis Geologorum Poloniae*) a year later, was the first original scientific paper of Professor Birkenmajer. These early studies in the Pieniny Mts., his beloved study area, initiated over 65 years ago and lasting up to the present day, were the beginning of Professor Birkenmajer's work on the stratigraphy, palaeogeography, and tectonic and regional setting of the Pieniny Klippen Belt, the northernmost Inner Carpathian element, bordering on and dovetailed with the structures of the Outer Carpathians. The doctoral thesis of Professor Birkenmajer, presented in 1957 at Warszawa University, supervised by Marian Książkiewicz, reviewed by Bronisław Halicki and Edward Passendorfer, devoted to the stratigraphy and palaeogeography of the Czorsztyn Succession, the shallowest series of the Pieniny Klippen Belt, was supplemented and published as a monograph in 1963. This paper includes tens of hand-drawn maps, sketches of rock exposures, and cross-sections prepared during his fieldwork with unbelievable precision and attention to detail, another "trademark" of Professor Birkenmajer. This and later fieldwork resulted in the detailed mapping of the Pieniny Klippen Belt in Poland, published as a series of eight geological map sheets at a scale of 1:10 000 (1959–1970). An even more detailed map is now in preparation and will be published by the Pieniny National Park; it has been prepared by Professor Birkenmajer at an unparalleled scale of 1:5 000!

Years of activity in the Pieniny Klippen Belt, both in the Polish and Slovak sectors, involving cooperation with several specialists, led Professor Birkenmajer to establish in 1977 a lithostratigraphic scheme for the Jurassic–Cretaceous of the Pieniny Klippen Belt in Poland. Most of these lithostratigraphic units have been adopted by Slovak geologists, and the scheme itself has remained almost unchanged up to now. It is noteworthy that Birkenmajer's lithostratigraphic scheme for the Pieniny Klippen Belt is one of only a few such formal ones in Poland, i.e., the proposed divisions follow the rules of the International Subcommission on Stratigraphic Classification (edited by Professor Birkenmajer in the Polish language in 1975). In 1986, Professor Birkenmajer summarized the results of his studies on the Pieniny Klippen Belt and reconstructed the geological history of one of most complicated structures in the world. Despite the passage of time, Professor Birkenmajer still remains devoted to his beloved area of study and continues to publish papers on the geology of the Pieniny Klippen Belt.

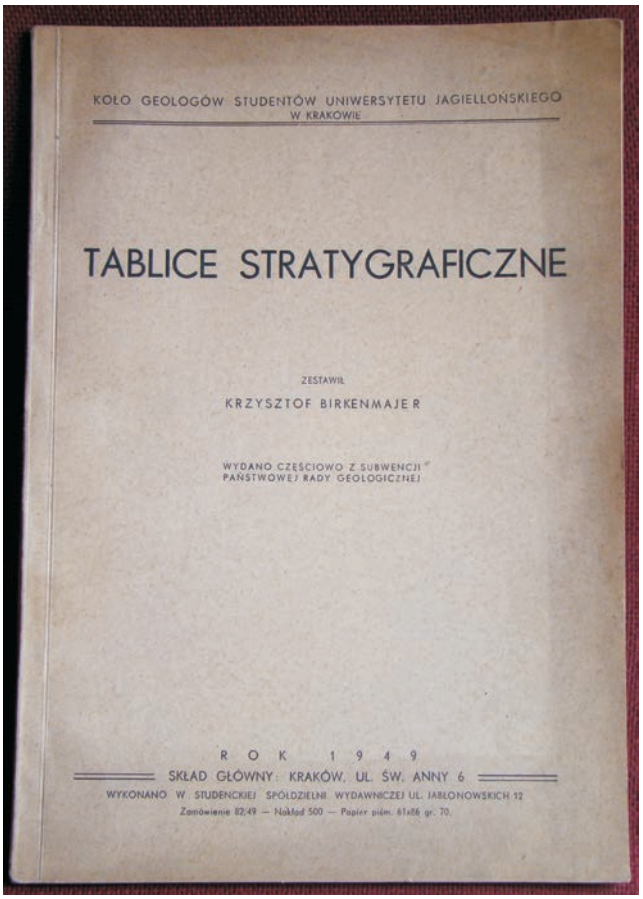
Not far from the Pieniny Mts., there is another glorious range of mountains, the Tatra Mts. Professor Birkenmajer visited them for the first time as a young boy, in the autumn of 1944, assisting his elder brother, Zygmunt. Soon after, the Tatra Mts. became the location, where he practiced mountaineering, another passion of the young Krzysztof Birkenmajer, who became a member of the Mountaineering Club of the Polish Tatra Society. This was another family legacy; his uncle, Wincenty Birkenmajer, one of the most outstanding Polish alpinists of the interwar period, died while climbing in the Tatra Mts. in 1933. The experience and climbing skills acquired in this way became very helpful in another of Professor Birkenmajer's activities, a few years later. Much later, the scientific activity of Professor Birkenmajer in the Tatra Mts. resulted in the revision of a part of the geological map of the Tatra Mts. (1:10 000) and in several studies on tectonics, lithostratigraphical subdivisions and karst phenomena.

The year 1956 saw the beginning of a new kind of adventure in the life of Professor Birkenmajer: polar exploration. Influenced by his older friend, Stanisław Siedlecki, and the need of a young man to explore the unknown, paraphrasing, *Go North, young man!*, Professor Birkenmajer took part in his first polar expedition in 1956. It was followed by 22 subsequent expeditions, before he bade farewell to the lands of ice and snow in Spitsbergen in 2002, at the age of 73! During his 23 expeditions, Professor Birkenmajer explored glaciated lands and led geological studies in the untamed wilderness areas of Spitsbergen, Eastern Greenland and Western Antarctica. As a result, he published a huge number of original papers and cartographic works, usually pioneering in nature. On Spitsbergen, he explored and described, *inter alia*, a section in the southern part of the island, almost 20 km thick and embracing the unbelievably long time-span of almost 1.8 billion years (Proterozoic-Cenozoic), and carried out cartographic works in the Hornsund fjord area. They were published as the first geological maps of this region at the scales of 1:75 000 and 1:100 000. Professor Birkenmajer's activities on Eastern Greenland focused on cartographic works (1:100 000) of Permian and Mesozoic rocks and studies of the shallow marine Oligocene, overlying basaltic complexes, associated with the initial stages of opening of the Northern Atlantic.

From 1977 to 2001, Professor Birkenmajer took part in eight expeditions to Western Antarctica, where his activities focused on cartographic works on the King George Island and studies on the stratigraphy of the Cretaceous and Cenozoic magmatic and sedimentary rock associations and their evolution. To his most remarkable achievements in the exploration of polar areas may be added the discovery and documentation of the oldest glaciations in Western Antarctica, radimetrically dated as Eocene, Oligocene and Early Miocene.

A huge collection of samples, mainly fossils, but also magmatic and sedimentary rocks assembled during his voyages, served as objects of study for numerous specialists and significantly contributed to our knowledge of the geological history of the polar areas.

Other, very important records of his activities in these far-away lands, are a number of geographic names, given by


KOŁO GEOLOGÓW STUDENTÓW UNIWERSYTETU JAGIELLOŃSKIEGO
W KRAKOWIE

TABLICE STRATYGRAFICZNE

ZESTAWIŁ
KRZYSZTOF BIRKENMAJER

WYDANO CZĘŚCIOWO Z SUBWENCJI
PAŃSTWOWEJ RADY GEOLOGICZNEJ

ROK 1949
SKŁAD GŁÓWNY: KRAKÓW, UL. ŚW. ANNY 6
WYKONANO W STUDENCKIEJ SPÓŁDZIELNI WYDAWNICZEJ UL. JABŁONOWSKICH 12
Zamówienie 82/49 — Nakład 500 — Papier piśm. 61x86 gr. 70.

Stratigraphic Tables (1949) – first publication of Professor Krzysztof Birkenmajer

Professor Birkenmajer and later officially approved by the Scientific Committee on Antarctic Research, which sound familiar to Polish ears: Fryderyk Chopin Ridge, Kraków Glacier, Mount Wawel, Mount Barbakan…

The achievements in polar exploration of Professor Birkenmajer were appreciated and honoured by Polish traveller and explorer circles, who nominated him for the distinction of "*Super Kolos*", awarded to him on February 15, 2014, in Kraków.

It is not possible for me to summarize all of the topics of scientific research and the achievements of Professor Birkenmajer here. Among the most important is his interest is palaeomagnetism and the radiometric dating of magmatic rocks. Problems associated with magmatic rocks have been always close to the Professor's heart: tens of publications dealing with the magmatic rocks of Poland [e.g., Permian porphyries and melaphyres of Kraków and the surrounding area, the Palaeozoic and Cenozoic basalts of Lower Silesia (Dolny Śląsk) and the Cenozoic andesites of the Pieniny Klippen Belt] and polar areas (e.g., the Eocene basalts of East Greenland, the intrusive rocks of Spitsbergen, the magmatic rocks and active volcanoes of Western Antarctica) were published in cooperation with many specialists.

If all of this were not enough, Professor Birkenmajer has been and still is deeply engaged in many other activities, including an editorial one (e.g., as Secretary and Chief Editor of *Studia Geologica Polonica*; 136 volumes between 1954 and 2014), activities for nature conservation, and ac-

tivities in many Polish and international scientific organizations, including the International Arctic Science Committee, the International Geological Correlation Programme and the Scientific Committee on Antarctic Research. He is an honorary Member of the Polish Geological Society, the Polish Geographic Society, the Geological Society of America, and Österreichische Geologische Gesellschaft, the holder of several honours and orders, among which the most meaningful for him is the Home Army Cross (*Krzyż Armii Krajowej*).

For almost his entire scientific career, Professor Birkenmajer has been associated with the Institute of the Geological Sciences of the Polish Academy of Sciences in Kraków. He was employed there between 1954 and 1999, when he retired, and was employed part-time between 2000 and 2004. However, even as an emeritus, Professor Birkenmajer remains active and works on a wide variety of scientific problems.

At this point, Dear Professor, I would like to wish you, on behalf of myself and the other contributors to this volume, many years of further activity, in good health and surrounded by your family and friends. We all wish you a hundred years, Dear Professor! Sto lat, Panie Profesorze!

Przemysław Gedl

Polar Expeditions of Krzysztof Birkenmajer

Between 1956 and 2002, **Krzysztof Birkenmajer** took part in 23 scientific polar expeditions, as a member or as leader: 13 to Spitsbergen, 2 to East Greenland and 8 to West Antarctica.

1. **Spitsbergen (Svalbard archipelago), 1956.** Arctic summer, 4 weeks. Member of a 5-men reconnaissance party, preparing for Polish participation in the IIIrd International Geophysical Year (IIIrd IGY), 1957–1958. Expedition leader, Stanisław Siedlecki.
2. **Spitsbergen, 1957.** Arctic summer, 3 months. Geological investigations in the Hornsund fjord area (Wedel Jarlsberg Land, Torell Land, Sørkapp Land), participation in erecting the Polish Scientific Station at Isbjørnhamna for the IIIrd IGY. Expedition leader, Stanisław Siedlecki.
3. **Spitsbergen, 1958.** Actic summer, 3 months. Geological investigations in the Hornsund fjord area (as above), IIIrd IGY. Expedition leader, Stanisław Siedlecki.
4. **Spitsbergen, 1960.** Arctic summer, 2 months. Geological investigations in the Hornsund fjord area (as above). International Geophysical Co-operation. Expedition leader, Stanisław Siedlecki. K. Birkenmajer coordinated the field work of the expedition's geological group, led the scientific excursion of the 21st International Geological Congress „Norden" (Copenhagen) to the Hornsund fjord.
5. **Spitsbergen, 1962.** Arctic summer, 2 months. Geological investigations of Torell Land and Sørkapp Land. Expedition of Norsk Polarinstitutt (Oslo): K. Birkenmajer (geological party leader) and 2 Norwegian assistants.
6. **Spitsbergen, 1966.** Arctic summer, 2 months. Geological investigations of Torell Land. Expedition of Norsk Polarinstitutt (Oslo): K. Birkenmajer (geological party leader) and 2 Norwegian assistants.
7. **Spitsbergen, 1970.** Arctic summer, 2 months. Geological investigations of Sørkapp Land and Torell Land. Expedition of Norsk Polarinstitutt (Oslo): K. Birkenmajer (geological party leader), 2 Norwegian and 1 Polish assistants.
8. **East Greenland, 1971.** Arctic summer, 2 months. Geological investigation of Scoresby Sund, Jameson Land and Scoresby Land. Expedition of Grønlands geologiske Undersøgelse (København); expedition leader, Niels Henriksen. K. Birkenmajer (geological party leader) and 1 Danish assistant.
9. **Spitsbergen, 1974.** Arctic summer, 2 months. Palaeontological and geological investigations in the Hornsund fjord area. Expedition of the Institute of Palaeobiology, Polish Academy of Sciences, Warsaw. Expedition leaders, K. Birkenmajer and G. Biernat, and 4 Polish members. Palaeomagnetism of the Hornsund area, 2 weeks, Institute of Geophysics of the Polish Ascademy of Sciences, Warszawa, and St. Louis University, USA: K. Birkenmajer (leader) and M. Kramer (USA).
10. **East Greenland, 1976.** Arctic summer, 2 months. Geological investigations between Kong Oscars Fjord and Clavering Ø. Expedition of Grønlands geologiske Undersøgelse (København), Agnete Steenfelt and Bjarne Leith Nielsen, leaders. K. Birkenmajer, geological party leader, plus 1 assistant.
11. **East Spitsbergen, 1977.** Arctic summer, 2 months. Expedition of the Institute of Geophysics, Polish Academy of Sciences, Warszawa, and St. Louis University, USA. Geological, palaeomagnetic and seismic investigations at Storfjorden and Hornsund. K. Birkenmajer (leader), 2 Polish (M. Jeleńska and J. Jeleński) and 1 US (J. Kohsmann) participants.
12. **West Antarctica, South Shetland Islands, King George Island: IInd H. Arctowski Polish Antarctic Station Expedition, 1977/78.** Antarctic Summer (5 months, including marine voyages). Organizer: Institute of Ecology of the Polish Academy of Sciences, Warszawa, S. M. Zalewski, expedition leader. K. Birkenmajer, geological investigations of the Admiralty Bay area, King George Island and participation in erecting the H. Arctowski Station.
13. **IIIrd H. Arctowski Station Expedition, West Antarctica, 1978/79.** Antarctic Summer (6 months, including marine voyages). Organizer: Institute of Ecology, Polish Academy of Science, S. Rakusa-Suszczewski, expedition leader. K. Birkenmajer, leader of the geological and palaeontological parties (5 persons).
14. **Vth H. Arctowski Antarctic Station Expedition, 1980/1981.** Antarctic Summer expeditition (7 months, including marine voyages). Organizer: Institute of Ecology, Polish Academy of Sciences (with a 6-man party for Earth Sciences, members from Institute of Geological Sciences, Polish Academy of Sciences; Palaeobiological Institute, Polish Academy of Sciences; Department of Meteorology and Climatology, Wrocław University). K. Birkenmajer expedition leader.
15. **West Antarctica: 2nd Geodynamic Expedition, 1984/85.** Expedition organized by the Institute of Geophysics (leader, A. Guterch) and the Institute of Geological Sciences, Polish Academy of Sciences, (K. Birkenmajer and 1 assistant). Antarctic Summer (2 months): Bransfield Strait and west coast of Antarctic Peninsula.
16. **West Antarctica: 3rd Geodynamic Expedition, 1987/88.** Expedition organized by the Institute of Geophysics (leader, A. Guterch), Institute of Geological Sciences (K. Birkenmajer and 2 assistants), and Institute of Palaeobiology, Polish Academy of Sciences (A. Gaździcki and 1 co-worker). Antarctic Summer (2 months).
17. **Spitsbergen, 1990:** Arctic Summer (1 month). Norsk Polarinstitutt's Expedition (Y. Ohta, W. K. Dallmann, K. Birkenmajer); geological comparative studies in S Wedel Jarlsberg Land and Sørkapp Land.
18. **West Antarctica: 4th Geodnamic Expedition, 1990/91.** Ex-

pedition organized by the Institute of Geophysics (leader, A. Guterch), Institute of Geological Sciences, Polish Academy of Sciences (K. Birkenmajer and 2 participants from Poland and USA), and Institute of Palaeobiology, Polish Academy of Sciences (A. Gaździcki and 1 co-worker). Antarctic Summer (2 months).

19. Spitsbergen, Hornsund, 1993: Arctic Summer (2 months), expedition of the Institute of Geological Sciences, Polish Academy of Sciences. K. Birkenmajer (leader) and two assistants. Geological investigations in the areas of Hansbreen and Werenskioldbreen, Wedel Jarlsberg Land.

20. King George Island, South Shetland Islands, West Antarctica: Brazilian Geological Expedition from the University of São Paulo, 1994: Antarctic Summer (2 months). K. Birkenmajer (leader of geological party) and 4 geologists (3 from São Paulo University, 1 from Nebraska University, USA).

21. Spitsbergen, Hornsund, 1995: Arctic Summer (2 months). Expedition of the Institute of Geological Sciences, Polish Academy of Sciences. K. Birkenmajer (leader) and 2 assistants. Geological investigations in SE part of Wedel Jarlsberg Land.

22. XXVth Expedition to H. Arctowski Station, King George Island, West Antarctica, 2000/2001: Antarctic Summer (2 months). Expedition organized by the Department of Polar Biology, Polish Academy of Sciences, T. Janecki (leader), K. Birkenmajer, geological investigations of the Admiralty Bay area, King George Island.

23. Spitsbergen, Bellsund (Calypsobyen), 2002: Arctic Summer (6 weeks). Geological expedition of the Institute of Geological Sciences, Polish Academy of Sciences. K. P. Krajewski (leader). K. Birkenmajer, geological investigations of the areas: Kapp Lyell, Recherchefjorden, Chamberlindalen.

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Birkenmajer, K., 1952. Kontakt melafiru z arkozą kwaczalską we wzgórzu Belweder koło Poręby Żegoty (Contact of the melaphyre with the Kwaczała Arkose at Belweder, Cracow district). *Biuletyn Instytutu Geologicznego*, 80: 5–17. [In Polish, with Russian summary.]

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Birkenmajer, **K**., **1953**. Ćwiczenia w oznaczaniu skał i minerałów skałotwórczych. [Exercises in determination of rocks and their minerals]. *Akademia Górniczo-Hutnicza*, 8: 1–143. Państwowe Wydawnictwo Naukowe, Kraków. [In Polish.]

Birkenmajer, **K**., **1954**. Sprawozdanie z badań geologicznych przeprowadzonych nad neogenem na Podhalu w latach 1949–1951 (Geological investigations of Podhale Neogene, Central Carpathians). *Biuletyn Instytutu Geologicznego*, 86: 59–79. [In Polish, with English and Russian summaries.]

Birkenmajer, **K**., **1954**. Sprawozdanie z badań geologicznych wykonanych w pienińskim pasie skałkowym w latach 1950–1951 (Geological researches in the Pieniny Klippen-belt, Central Carpathians). *Biuletyn Instytutu Geologicznego*, 86: 81–115. [In Polish, with English and Russian summaries.]

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Birkenmajer, **K**. & Znosko, J., **1955**. Przyczynek do stratygrafii doggeru i malmu pienińskiego pasa skałkowego (Contribution to the stratigraphy of the Dogger and Malm in the Pieniny Klippen-belt, Central Carpathians). *Rocznik Polskiego Towarzystwa Geologicznego* (*Annales de la Société Géologique de Pologne*), 23: 3–36. [In Polish, with English and Russian summaries.]

Birkenmajer, **K**., **1956**. Występowanie wód mineralnych na tle budowy geologicznej Szczawnicy (Occurrence of mineral waters against the background of geological structure of Szczawnica (Carpathians)). *Przegląd* Geologiczny, 4(11): 499–502. [In Polish.]

Birkenmajer, **K**., **1957**. Dajki andezytowe góry Bryjarki w Szczawnicy (Andesite dykes of Bryjarka Mt. in Szczawnica, Pieniny Range, Carpathians). *Przegląd Geologiczny*, 5(2): 62–65. [In Polish.]

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Birkenmajer, **K**., **1958**. Nowe dane o geologii skał magmowych okolic Szczawnicy (New contributions to the geology of magmatic rocks of the Szczawnica area within the Pieniny Klippen-belt). *Prace Muzeum Ziemi*, 1: 89–103. [In Polish, with English summary.]

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Birkenmajer, **K**., **1958**. Przewodnik geologiczny po pienińskim pasie skałkowym. Część I. Szkic geologiczny pasa skałkowego. Wydawnictwa Geologiczne, Warszawa, 135 pp. [In Polish.]

Birkenmajer, **K**., **1958**. Przewodnik geologiczny po pienińskim pasie skałkowym. Część II. Wycieczki w rejonie Czarny Dunajec-Nowy Targ-Frydman. Wydawnictwa Geologiczne, Warszawa, 72 pp. [In Polish.]

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Birkenmajer, **K**., **1958**. Polskie badania na Spitsbergenie (Polish investigations in Svalbard). *Przegląd Geologiczny,* 6: 88–89. [In Polish.]

Birkenmajer, **K**., **1958**. Preliminary report on the stratigraphy of

the Hecla Hoek Formation in Wedel-Jarlsberg Land, Vestspitsbergen. *Bulletin de l'Académie Polonaise des Sciences, Série des Sciences Chimiques, Géologiques et Géographiques*, 6: 143–150.

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