

Załącznik 3b

Summary of Professional Accomplishments

Izabela Ploch, PhD

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1. Name

Izabela Ploch

2. Diplomas, degrees conferred in specific areas of science or arts, including the name of the institution which conferred the degree conferment, title of the PhD dissertation.

Geology Technician, Geological Technical School in Warsaw, 1990, Thesis entitled: Rocks and minerals of the Łądek and Śnieżnik metamorphic. Supervisor: dr Włodzimierz Mizerski

Master of Geology in the field of stratigraphic and prospecting geology, Faculty of Geology, University of Warsaw, 1997, Thesis entitled: *Lower Cretaceous of the north-eastern wing of the Tomaszów Trough*. Supervisor: prof. dr hab. Ryszard Marcinowski

PhD in Earth Sciences in the field of geology (Annex 1), Faculty of Geology, University of Warsaw, 2002. Thesis entitled: *Ammonites of the Valanginian of Poland from the extra-Carpathian region*. Supervisor: prof. dr hab. Ryszard Marcinowski

3. Information on employment in research institutes or faculties/departments or school of arts.

1997–2002 PhD student at the Faculty of Geology, University of Warsaw, Institute of Fundamental Geology, Department of Historical Geology.

from 2003 to present assistant professor:

2009–2012 Geological Museum of the Polish Geological Institute

2012 Geodiversity Protection and Geotourism Program

2012–2014 Department of Service and Organization of International Cooperation.

2014–2017 Climate and Environmental Change Program

2017 –2024 Department of Regional and Petroleum Geology, Department of Regional Geology, Department of Regional and Deposit Geology

4. Description of the achievements, set out in art. 219 para 1 point the Act.

4.1. Cycle of scientific articles related thematically, pursuant to art. 219 para 1. 2b of the Act. Title of scientific achievement:

Biostratigraphy and paleoenvironmental studies of the Polish Basin based on Lower Cretaceous ammonites

4.2. Publications included in the scientific achievement.

Electronic versions of publications submitted as the scientific achievement are included in **Załącznik 5**, while the co-authors' statements on individual contributions to the publications are provided in **Załącznik 6**.

[A1] **Ploch I.** 2003; Taxonomic interpretation and sexual dimorphism in the Early Cretaceous (Valanginian) ammonite *Valanginites nucleus* (Roemer, 1841). *Acta Geologica Polonica*, vol. 53, no. 3: 201-208.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 13 points; 2024 Score: 100 pkt.

IF for the year of publication: 0,4; current: 1,1; 5-year IF: 1

Citation count:

Scopus: 8, (excluded autocitations) 6

WoS:-

Google Scholar: 14, (excluded autocitations) 12

My participation in the preparation of the publication consisted: 1) management the research project covering the studies described in the paper, 2) collecting research material and conducting analyses, 3) developing research concepts and methodology, 4) literature studies, 5) compilation and calculation of research results in Tables and Figures 5-11 and the Appendix, 6) taking photos in Figures 5a-d, 7) creation of Figures 1-11, 8) preparation of the manuscript text, 9) preparation of responses to reviews, 10) preparation of the final version of the manuscript.

[A2] Dziadzio P., Gaździcka E., **Ploch I.**, Smoleń J. 2004; Biostratigraphy and sequence stratigraphy of the Lower Cretaceous in Central and SE Poland. *Annales Societatis Geologorum Poloniae*, vol. 74: 125-196.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 20 points; 2024 Score: 100 pkt.

IF for the year of publication 0,4; current: 1,2; 5-year IF -

Citation count:

Scopus: 23, (excluded autocitations) 19

WoS:-

Google Scholar: 34, (excluded autocitations) 26

My contribution to the preparation of the article included: 1) participation in the scientific project covering the research described in this work, 2) collection of research material on Lower Cretaceous ammonites, 3) development of the concept and methodology of research concerning the chapter on Lower Cretaceous ammonites from the study area, 4) literature studies on Lower Cretaceous ammonites, 5) selection and analysis of ammonites important for stratigraphy and paleogeography, 6) preparation of Figures 2-7, 9) preparation of the part of the manuscript text concerning Lower Cretaceous ammonites, 10) preparation of responses to

reviews in the part concerning Lower Cretaceous ammonites, 11) participation in creating the final version of the manuscript of the article – the part concerning Lower Cretaceous ammonites and biostratigraphic conclusions.

[A3] **Ploch I.** 2007; Intraspecific Variability and Problematic Dimorphism in the Early Cretaceous (Valanginian) Ammonite *Saynoceras verrucosum* (d'Orbigny, 1841). *Acta Geologica Sinica* Vol. 81, No 6, pp. 801-806.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 20 points; 2024 Score: 100 pkt.

IF for the year of publication 1,8; current: 3,5; 5-year IF 1,7

Citation count:

Scopus: 4, (excluded autocitations) 1

WoS: 8, (excluded autocitations) 6

Google Scholar: 9, (excluded autocitations) 6

My contribution to the preparation of the article included: 1) management of the research project covering the studies described in this paper, 2) collection of research material, 3) development of the research concept and methodology, 4) literature study, 5) compilation and calculation of research results in Figures 4-7, 6) taking photos for Table 1, Figures 1-11, 7) making Figures 1-7, 8) preparation of the manuscript text, 9) preparation of responses to reviews, 10) creation of the final version of the manuscript.

[A4] **Ploch, I.**, 2018. A discussion about Valanginian Neocomitinae from Central Poland, their ontogeny and possible origin. In: Bengtson, P. (Ed.), *Cretaceous Ammonites: A Volume in Memory of Richard A. Reymont (1926–2016)*, *Cretaceous Research* 88, 123-148.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 100 points; 2024 Score: 70 pkt.

IF for the year of publication 2,1; current: 1,9; 5-year IF 2,2

Citation count:

Scopus: 3, (excluded autocitations) 2

WoS: 3, (excluded autocitations) 2

Google Scholar: 3, (excluded autocitations) 2

My contribution to the preparation of the article included: 1) management of the research project covering the studies described in this work, 2) collection of research material, 3) development of the research concept and methodology, 4) literature studies, 5) selection and processing of ammonites for research, 6) compilation and calculation of research results in graphs 9 A, B, 12 A, B, 15 A, B and supplementary materials – Figs. 1-8, 7) taking photographs for Figs. 3.1-3, 4.1, 5.1-6, 6.1-5, 7.1-2, 11.1-3, 13-1-4, 14.1-6, 8) making Figs. 1-16, 9) preparation of the manuscript text, 10) preparation of responses to reviews, 11) creation of the final version of the manuscript.

[A5] Grabowski, J., Chmielewski, A., **Ploch, I.**, Rogov, M., Smoleń, J., Wójcik-Tabol, P., Leszczyński, K., Maj-Szeliga, K. 2020. Palaeoclimatic changes and inter-regional correlations in the Jurassic/Cretaceous boundary interval of the Polish Basin: portable XRF and magnetic susceptibility study. Newsletter on Stratigraphy, 54 (2). 1-36.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 140 points; 2024 Score: 140 pkt.

IF for the year of publication 2,9; current: 2,1; 5-year IF 3,5

Citation count:

Scopus: 14, (excluded autocitations) 12

WoS: 10, (excluded autocitations) 9

Google Scholar: 13, (excluded autocitations) 11

My contribution to the preparation of the article included: 1) participation in the scientific project covering the research described in this work, 2) collection of research material on Berriasian ammonites, 3) participation in the development of the research concept and methodology, 4) literature studies, 5) selection and development of Berriasian ammonites, 6) co-production of Figures 1-3,12, 9) participation in the preparation of the text of the manuscript – the part concerning Berriasian ammonites and stratigraphic and paleoclimatic conclusions, 10) participation in the preparation of responses to reviews, 11) participation in the creation of the final version of the manuscript of the article.

[A6] Dziadzio P., **Ploch I.**, Smoleń J.,2021. Biostratigraphy and sequence stratigraphy of the Lower Cretaceous in the NW part of the Mid-Polish Trough, Geological Quarterly, 65 (4): 1-21.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 100 points; 2024 Score: 100 pkt.

IF for the year of publication 1,51; current: 1,0; 5-year IF 1,3

Citation count:

Scopus: 0

WoS: 0

Google Scholar: 0

My contribution to the preparation of the article included: 1) managing the scientific project covering the research described in this work, 2) collecting part of the research material, 3) participating in the development of the research concept and methodology, 4) literature studies, 5) selecting and processing Lower Cretaceous ammonites from the study area, 6) preparing the results of biostratigraphic and geophysical studies, 7) taking A-G photos for Figures 2, 8) preparing Table 1 and Figures 1-4, 9) preparing the text of the manuscript (except for the chapters on geophysical studies and foraminifera and ostracods), 10) preparing responses to reviews, 11) creating the entire, final version of the manuscript of the article.

[A7] Ploch, I., 2022. Paleoeological implications of stable isotope analyses of the Upper Valanginian ammonites. *Cretaceous Research*, 140, 1-20.

Indexed in the Journal Citation Report

List MNiSW, Scoring for the year of publication: 100 points; 2024 Score: 70 pkt.

IF for the year of publication 1,8; current: 1,9; 5-year IF 1,9

Citation count:

Scopus: 1, (excluded autocitations) 1

WoS: 1, (excluded autocitations) 1

Google Scholar: 1, (excluded autocitations) 1

My contribution to the preparation of the article included: 1) managing the scientific project covering the research described in this work, 2) collecting the research material, 3) developing the research concept and methodology, 4) literature studies, 5) selecting and preparing samples for testing the content of Ca%, Mg, Na, Sr, Fe, Mn, Al, Ni, Cu, Ce, La, Ba, Zn, Pb, U and for analyzing the $\delta^{13}\text{C}$, $\delta^{18}\text{O}$, $^{87}\text{Sr}/^{86}\text{Sr}$, 6) compiling and calculating the research results in Tables 1-2, Graphs 5-11, 7) taking photos for Figure 10, 8) making Figures 1-11, 9) preparing the text of the manuscript, 10) preparing responses to reviews, 11) creating the final version of the manuscript.

4.3. Projects directly related to a scientific achievements.

The scientific achievement, which is the basis for applying for the academic degree of Ph.D., includes 7 thematically related publications, which are scientific articles from journals listed by the Ministry of Science and Higher Education. The work carried out within the framework of two grants financed by the State Committee for Scientific Research, one by the NATO Science and 6 statutory research projects financed by the Ministry of Science and Higher Education, carried out at the Polish Geological Institute, enabled the scientific research published in the works [A1]-[A7]. The aim of the research was a comprehensive analysis of the ammonite fauna from the Polish Basin from the Berriasian to the Aptian. The research was based on the revision of previous collections and new finds, associated with other fossil groups and geophysical analyses in order to obtain detailed information on the stratigraphy and palaeoenvironment. The ammonite studies were supported by the analysis of stable isotopes of oxygen, carbon and strontium in order to obtain accurate data on the palaeoenvironment and palaeoecology of ammonites. In 1999-2000 I was the project manager and one of the prime contractors of the grant [C1] title: *The problem of sexual dimorphism as a manifestation of intraspecific variability of Valanginian ammonites from Wąwół (Tomaszów Basin)*. The obtained results were presented at the international conference [B1] and in the publication [A1]. I was the prime contractor of the grant [C2] managed by Elżbieta Gaździcka

in 2000-2003 title: *Comprehensive and high-resolution stratigraphy of the Lower Cretaceous in the central and southeastern part of the Polish Lowlands in relation to the cyclical development of the sedimentary basin*. The obtained results were presented at the international conference [B2] and in the publication [A2]. In 2005-2008, I managed a NATO research grant entitled: *Strategic understanding of security threats caused by global climate change* [L4], the results of which were presented at an international conference [J2]. In 2006-2021, I managed statutory projects entitled: *High-resolution Lower Cretaceous stratigraphy in the northwestern part of the Polish Lowlands* [R7], *Predicting climate change and its consequences - building a program and international cooperation* [R8], *Biostratigraphy and stratigraphy of the Lower Cretaceous sequence in the northwestern part of the Central Polish Basin* [R20]. I was one of the prime contractors in statutory projects entitled: *Revision and scientific development of geological information collected in the collections of the Geological Museum of the Polish Geological Institute* [R10, R12], *Development of deep borehole profiles* [R22]. The research results were presented at international conferences [J3], [J5], [J8], [J10], [J20] and national conferences [I6], [I9], [I10], [I11] and in publications [A3], [A4], [A5], [A6]. In the years 2007-2019 I managed statutory projects entitled: *Global climate change in the Lower Cretaceous paleoenvironmental record* [R16], *Paleoecological implications of stable isotope analyses of the Valanginian ammonites* [R19], the results of which were presented at international conferences [J6], [J9] and in the publication [A7].

4.4. Overview of achievements.

4.4.1. Introduction.

The Lower Cretaceous sedimentary succession in the Polish Lowlands have so far been studied with regard to stratigraphy (e.g., Marek, 1968, 1969; Marek, Raczyńska, 1973; Raczyńska, 1979), however, formal biostratigraphic zones based on ammonites, corresponding to the stratigraphic schemes presently used in Europe were distinguished mainly for the Valanginian of the Tomaszów Basin (Kutek i in., 1989; Ploch, 2003; Dziadzio i in., 2004) and the Middle and Upper Albian from the Annopol area (e.g., Marcinowski, Wiedmann, 1990; Kennedy, Machalski, 2015). Informal stratigraphic units described as “Beds” have been distinguished for the uppermost Middle and Upper Berriasian (Ryazanain), Valanginian, Hauterivian (Marek, 1964, 1968, 1969, 1977, 1984, 1997; Marek, Raczyńska, 1973, 1979; Raczyńska, 1979; Marek, Szulgina, 1996; Marek, Rajska, 1997). In the area of the Polish Lowlands, the stratigraphic position of individual Lower Cretaceous sedimentary

series was precisely determined and correlated (e.g., Dziadzio i in., 2004, 2021; Gaździcka i in., 2006).

The particular palaeogeographic position of the Polish Basin, situated between the two major palaeogeographic provinces – Tethyan and Boreal resulted in mixed influences of them both and resulted in variable influences which was reflected in the fauna assemblages occurring there (Kutek et al. 1989, Kutek and Marcinowski 1996, Dziadzio et al. 2004, 2021). Due to their mixed Tethydan-Boreal character, they are of great importance for the correlation of stratigraphic patterns of these two paleogeographic provinces. Periodically, there was also a connection with the Central Russian Basin (Marek, 1967, 1997; Raczyńska, 1967; Marek, Raczyńska, 1979; Marek, Szulgina, 1996; Mitta, Ploch, 2012).

In the Polish Lowlands, the Jurassic/Cretaceous boundary was, as in the entire Boreal domain, traditionally placed between the Volgian Stage, developed in the Purbeck facies, and the Ryazanian Stage represented by marine successions (e.g., Marek and Raczyńska, 1973; Dembowska and Marek, 1976; Marek et al., 1989; Grabowski et al., 2020). In the Tethyan domain, it was placed between the Tithonian and Berriasian. The base of the Berriasian is located in the Upper Volgian (Housa et al., 2007; Wimbledon et al., 2011; Bragin et al., 2013; Rogov, 2014; Wimbledon, 2014, 2017; Schnabl et al., 2015; Zakharov and Rogov 2020; Grabowski et al., 2020). The facies character of the Jurassic-Cretaceous sediments in the Polish Lowlands, developed as shallow-water clastic and evaporite formations, means that only micropalaeontological methods are of importance for biostratigraphy. In the higher levels, the lithofacies development of the Lower Cretaceous sediments are characterized by a latitudinal pattern. In the southeastern part of the basin, sedimentation was dominated by carbonate sediments, while in the central and northwestern parts, mainly siliciclastic formations were deposited. In the Middle and Upper Berriasian, Valanginian, Hauterivian and Albian, the stratigraphic units were based on ammonites – an orthostratigraphic group for this geological period (e.g., Marek, Raczyńska, 1973; Marek i in., 1989; Marek, Rajska, 1997; Kutek i in., 1989; Marcinowski, Wiedmann, 1990; Dziadzio i in., 2004, 2021; Mitta, Ploch, 2012), and in parallel, levels and associations distinguished on the basis of microfossils are used (e.g., Dadlez, Dembowska, 1965; Dembowska, 1973a, b; Bielecka, 1975; Bielecka, Styk, 1973; Sztejn, 1973, 1977, 1984; Raczyńska, 1979, 1987; Marek, Rajska, 1997; Dziadzio i in., 2004, 2021). The Lower Cretaceous sediments have been best documented in the central part of the sedimentary basin. In recent years, the stratigraphic position of individual Lower Cretaceous sedimentary series has been precisely determined, in combination with the

analysis and correlation of geophysical logs (Dziadzio i in., 2004; Gaździcka i in., 2006). They were correlated with the less well-documented Lower Cretaceous sediments of the north-western part of the Polish Lowlands (Dziadzio i in., 2021).

4.5. Material and methods

The palaeontological analysis of ammonite were done in selected boreholes: Oświno IG 1, Strzelno IG 1, Kcynia IG 2, Łowicz IG 1, Żychlin IG 1, Żychlin IG 3, Potok IG 1, Białobrzegi IG 1, Zagorzyce 7, Gostynin IG 1, Gostynin IG 4. The palaeontological analysis of ammonite was supplemented by data from the following boreholes: Koraczewko IG 1, Szamotuły Geo 8, Gronowo 2, Człopa 3, Szamotuły Geo 27, Toporzysko, Kukawy TK 13, Kcynia IG 2, Chrośna and Bądków 7/17, from the collection of Prof. S. Marek, housed in the Geological Museum of the Polish Geological Institute – National Research Institute (Dziadzio i in. 2004, 2021).

The ammonites were collected from outcrop at Wąwał near Tomaszów Mazowiecki. They came from the collections of the Faculty of Geology, University of Warsaw and the Institute of Palaeobiology Polish Academy of Sciences, Warsaw. These collections were collected by: R. Marcinowski, A. Radwański, C. Kulicki, J. Kutek, J. Dzik, A. Kaim, T. Praszkiel, K. Dembicz and I. Ploch. Information from the studied collections was used in articles by I. Ploch (2003, 2007, 2018, 2022), P. Dziadzio et al. (2004, 2021), J. Grabowski et al. (2020).

Comparative studies on Lower Cretaceous ammonite faunas from the Polish and German basins, discussed in the articles by I. Ploch (2003), P. Dziadzio et al. (2004), were made at Geological Institute in Hannover. These studies concerned J. Mutterlose, M. Wippich and K. Kessel collections of Ruhr-Universität, Bochum and private collection of K. Wiedenrot. Ammonite collections from Tethyan basins were studied at the Geological Museum of the Dolomieu Institute in Grenoble and at the Geological Museum of the Claude-Bernard University in Lyon, including the S. Reboulet's private collection and were discussed in the articles by I. Ploch (2003), P. Dziadzio et al. (2004).

In the analysis described in the article by I. Ploch (2007) the following statistical methods were used: *t*-test and the Kolmogorow-Smirnow goodness-of-fit test.

Samples for isotopic analyses include shells of ammonites (85 samples, of 51 specimens of the suborder Ammonitina von Zittel and six specimens of the suborder Ancyloceratina Wiedmann), bivalves (10 samples), echinoid spines (3 samples), scaphopods (1 sample) and belemnites (1 sample). The samples were mechanically removed from the matrix fragments collected comprised all shell layers. Whenever possible, samples were taken every 1 or 2 cm. Most of the samples originate from the Wąwał section and span the interval from the upper *verrucosum* to the *tritychoides* ammonite zones (upper Valanginian). Some samples were taken from the same clay fragments, some others from precise spots in the succession, whereas others were taken from older collections for which only an approximate position in the succession was known. When possible, several samples were recovered from a single specimen to find behavioural changes during ontogeny. The samples were taken from rather adult forms but the entire collection from the Wąwał section also contains many juvenile ammonites and both macroconchs and microconchs can be recognised. Additional samples from wells were collected from the Kcynia IG 2, Mogilno Geo 65, Gostynin IG 4, Koraczewko, Bodzanowo TK, and Żychlin IG 1 well cores spanning an interval between the middle Berriasian and the Valanginian. Ammonites and one belemnite were taken from core collections with designated depth intervals. Berriasian samples are from the informal: “Beds with *Riasanites*, *Himalayites* and *Picteticeras*” and “Beds with *Surites*, *Euthymiceras* and *Neocosmoceras*”.

Palaeotemperatures were calculated using the equation of E.L. Grossman and T.L. Ku (1986) for aragonite and that of T.F. Anderson and M.A. Arthur (1983) for calcite. The preservation of ammonite shells was estimated using several methods. Ammonite shells were treated with the X-ray diffraction method, which indicated their pure aragonitic composition. Scanning electron micrographs of fresh fracture surfaces of the ammonite nacre layer, with individual nacreous lamellae, showed no recrystallization. Cathodoluminescence examination of a belemnite sample showed no diagenetic changes. The trace element composition of the ammonite shells is in agreement with that reported for recent nautiloids. Thus, diagenetic alteration is excluded and consequently the received isotopic data are taken as reflecting the original seawater conditions. Additionally, an open sea environment is supported by faunal and floral assemblages (Dziadzio et al., 2004) and by results of $^{87}\text{Sr}/^{86}\text{Sr}$ analyses. Thus, the stable isotope data should not have been changed by evaporation or freshwater influx from rivers (Ploch, 2022).

4.6. Berriasian

The middle and upper Berriasian ammonites are abundant and relatively well preserved, but some specimens are crushed which hinders their taxonomic identification. In the central part of the Polish Basin, two informal stratigraphic units were distinguished on the basis of ammonite fauna. Lower “zone” “Beds with *Riasanites*, *Himalayites* and *Picteticeras*” corresponds to the Tethyan *occitanica* Zone and the lower part of the *boissieri* Zone, the English *kochi* and *icenii* zones and central Russia *rjasanensis* Zone. The upper “zone” “Beds with *Surites*, *Euthymiceras* and *Neocosmoceras*” corresponds to the upper part of the *boissieri* Zone and the English *stenomphalus* and *albidum* zones (Marek, 1964, 1968, 1969, 1977, 1984, 1997; Marek, Raczyńska 1973, 1979; Marek i in., 1989; Marek, Shulgina, 1996; Dziadzio i in., 2004).

S. Marek (1967) recognized two units in this area, which were considered as corresponding to zones of European Russia: the zones of *Riasanites rjasanensis* and *Surites stenomphalus*. Recently, Mitta and Ploch (2012) revised some Polish Ryazanian ammonites. They figured two specimens from the Kcynia IG 2 borehole: *Riasanites* sp. Nov. These authors also re-ascribed *Neocomites* cf. *platycostatus* Sayn (Marek 1967, pl. II, fig. 5, 6) as *Riasanella* sp. nov., and, in addition to *Riasanites* sp. nov., confirmed the presence of *Riasanites swistowianus* (Nikitin) in the Kcynia IG 2 borehole (Marek 1967, pl. II, fig. 1). The occurrence of *R. swistowianus* (Nikitin) (Mitta and Ploch 2012) suggests the presence of the *swistowianus* Subzone, the lowermost subzone of the *rjasanensis* Zone (Grabowski i in., 2020). It suggests connection with the Russian Basin of the *Riasanites swistowianus* Subzone earlier than hitherto considered for the *Surites spasskensis* Subzone (*Riasanites rjasanensis* Zone) (Sasonova, 1977). *R. swistowianus* (Nikitin) has been found outside of the Russian and Polish Basins mainly in the Mangyslak region, which may suggest a direct connection between the Russian and Polish basins (Mitta and Ploch, 2012). In the Northern Tethys, *Riasanites* cf. *swistowianus* (Nikitin) has been figured from the Stramberk succession (Vašíček and Skupien, 2016: fig. 7B, C; Vašíček et al., 2017: fig. 6D, E), and may have migrated there from the Polish Basin. Thus, revision of Polish material supports the concept of a direct connection between the Boreal and Tethyan basins through the Polish Trough since the earliest Ryazanian (Dziadzio et al., 2021).

4.6.1. Analyses of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ of the upper Berriasian

Studies of stable isotopes of oxygen, carbon and strontium were carried out for the first time for Berriasian ammonites. The Berriasian ammonite shell samples were not numerous, therefore the conclusions are not as far-reaching as for the upper Valanginian material. The middle and upper Berriasian ammonite samples are from the genera: *Surites*, *Neocosmoceras*, *Berriasella*, *Riazanites* which have a rather discocone shape and a shell morphology indicating a nektonic habitat (Westermann, 1996). Based on such limited number of samples, it cannot be easily estimated where they lived in the water column. However, the results of $\delta^{18}\text{O}$ values are similar compared to the benthic or epibenthic upper Valanginian ammonites from the Wąwał section - around 12-13°C. During the middle and late Berriasian, Tethyan and Boreal ammonites existed in the Polish Basin, therefore a similar palaeoenvironment could be interpreted for both the middle and late Berriasian, and the late Valanginian times. The $^{87}\text{Sr}/^{86}\text{Sr}$ results from the lower, lower/middle Berriasian are rather in agreement with the values indicative of this age (Ploch, 2022).

4.7. Valanginian

The lowermost Valanginian ammonites: *Neocomites* and *Neohoploceras* were found in the Łowicz IG 1, Koraczewko IG 1 and Kcynia IG 2 drill cores. They occur beneath the layer with Boreal ammonites of the genus *Platylenticeras*, that characterize the *robustum* Zone in the German Basin (Dziadzio et al., 2004, 2021). This zone is there correlated with the lowermost Valanginian (Kemper, 1961). In the Łowicz IG 1 well section, the sediments with *Neocomites* and *Neohoploceras* were hitherto included into the “Beds with *Platylenticeras*”, while sediments with *Platylenticeras* – into the “Beds with *Polyptychites*” (Marek, 1986). The other early Valanginian species, *Karakaschiceras quadristrangulatum* (Sayn), was found in a similar stratigraphical position in the outcrop at Wąwał. It appears there also below the Boreal ammonites of the *robustum* Zone (Kutek et al., 1989; Dziadzio et al. 2004). The stratigraphical position of the lowermost Valanginian ammonites is determined based on their occurrence in the sections – below the ammonites of *robustum* Zone and of their Valanginian character. The earliest Valanginian ammonites appear the continuation of the Mediterranean influences marked in the Polish Basin area since the Berriasian (Dziadzio et al., 2004).

The next biostratigraphic zone is *robustum* and was distinguished in the Wąwał section. A revision of the earlier collections and the new findings at the Wąwał outcrop allowed to identify the following species: *Platylenticeras (Platylenticeras) robustum*

robustum (Koenen), *Platylenticeras* (*Platylenticeras*) *parcum parcum* Koenen, and *Platylenticeras* (*Platylenticeras*) *parcum isterberense* Kemper (Dziadzio et al., 2004). The specimens of *Platylenticeras* (*Platylenticeras*) *parcum* Koenen were probably described as *Platylenticeras* (*Platylenticeras*) *gervilianum* (d'Orbigny) by previous authors (Lewiński, 1932; Kokoszyńska, 1956; Pruszkowski, 1962). Ammonites of the species *Platylenticeras* (*Platylenticeras*) *parcum* Koenen, found in the Łowicz IG 1 core are also indicative of the *robustum* Zone (Dziadzio et al., 2004). These sediments were hitherto included in the „Beds with *Polyptychites*” (Marek, 1986).

At Wąwał, a specimen of *Platylenticeras* (*Tylopoceras*) *fragile* Koenen was found above ammonites belonging to the *robustum* Zone (Dziadzio et al., 2004). Specimens of *Platylenticeras* (*Tylopoceras*) *fragile* Koenen were previously described only as *Platylenticeras* (*Tylopoceras*) cf. *marcoucianum* (d'Orbigny) (Lewiński, 1932; Kokoszyńska, 1956; Pruszkowski, 1962). In the Lower Saxonian Basin, this species may occur in the *heteropleurum* Zone (Kemper, 1961, 1992). Various species of *Platylenticeras* came into the Polish Basin from the German one (Dziadzio et al., 2004).

At the Wąwał section, *Karakaschiceras quadristrangulatum* (Sayn), *Karakaschiceras heteroptychum* (Pavlow), *Karakaschiceras pronecostatum* (Felix), and *Neohoploceras subgibbosum* (Wiedmann) occur above the ammonites of the *robustum* Zone or together with them. The interval would be correlated with the Tethyan *petransiens* Zone, what points out for the oldest occurrence of the genus *Karakaschiceras*, hitherto known from the Upper Valanginian, in the Tethyan Basin (Kutek et al., 1989).

The Upper Valanginian is clearly marked in the Wąwał exposure by the appearance of *Saynoceras verrucosum* (d'Orbigny). This species characterizes the *verrucosum* Subzone, described also as the *verrucosum* horizon within the *verrucosum* Zone (Kutek, Marcinowski, 1996). The core material has not provided unequivocally identifiable fossils of this ammonite species. The forms described as *Saynoceras verrucosum* (d'Orbigny) (Marek, 1969) are juvenile specimens that may belong to some other genus as well. Only in the Potok IG 1 core *Valanginites nucleus* (Roemer) was found, which may be indicative of the *verrucosum* Zone (Dziadzio et al., 2004). Boreal ammonites of genus *Dichotomites* appear above the last appearance of *Saynoceras verrucosum* (d'Orbigny), in the higher part of the Wąwał section. This fact allowed to refer this part of the section to the German ammonite zonation (Dziadzio et al., 2004). The species: *Valanginites nucleus* (Roemer), *Neohoploceras brandesi* (Kenen), and *Dichotomites* are concurrent in the Wąwał section, in an interval ca. 0.5 m thick. The specimens of *Valanginites nucleus* (Roemer) in this part of the section differ from the earlier

forms in their nearly smooth shell and greater dimensions. The same features are displayed by the terminal forms of this species in the Lower Saxonian Basin (Kurt Wiedenroth, pers. comm., 2000). This indicates that they appeared in the Polish Basin together with ammonites of genus *Dichotomites* immigrating from the Lower Saxonian Basin (Ploch, 2003). The range of this species in the Lower Saxonian Basin reaches the *hollwedensis* Zone; hence the described interval is attributed to this zone. The younger zones *crassus* and *polytomus* were combined because of the lack of precise location in the section of the nominal species *Dichotomites crassus* Kemper. The species: *Dichotomites evolutus* Kemper (occurring since the first appearance of genus *Dichotomites* in the Wąwał section) and *Dichotomites krausei* Kemper occur in both horizons and cannot be used for their separation. *Prodichotomites complanatus* (Koenen) appears in the Wąwał section earlier than *Dichotomites*, and its range ends in the *triptychoides* Zone (Dziadzio et al., 2004). In the Lower Saxonian Basin its range is limited to the *polytomus* Zone (Kemper, 1978).

The appearance of *Dichotomites triptychoides* Kemper in the Wąwał section marks the base of the *triptychoides* Zone. In contrast to the situation in the Lower Saxonian Basin where *Dichotomites evolutus* Kemper disappears before the appearance of *Dichotomites triptychoides* Kemper (Kemper, 1978), the two species co-occur in the Polish Basin (Dziadzio et al., 2004). Two morphological types represent intraspecific variation in *Dichotomites evolutus* Kemper – one with higher, the other with lower whorl height. Unlike in the Lower Saxonian Basin, mainly forms with lower whorl height are present in the Polish Basin. Gigantic forms also appear in the higher part of the range of this species, with shells reach even one metre in diameter (specimen collected by A. Kaim). No specimens this size were reported from outside the Polish Basin. Difference between the populations of *Dichotomites evolutus* Kemper from the Polish Basin and the neighbouring Lower Saxonian Basin, as well as the differing stratigraphic ranges of this species in both basins, indicate the development of endemic features within the Polish Basin population. Perhaps a better adaptation to environmental conditions in the Polish Basin, subject to both the Tethyan and Boreal influences, allowed for the longer occurrence of this species, as compared with the Lower Saxonian Basin (Dziadzio et al., 2004).

The lack of typical Mediterranean ammonites (*Phylloceras*, *Lytoceras*) may indicate that not all Tethyan forms were able to adapt to the environment in the Central European Basin (Kutek et al., 1989). Typical boreal ammonites, such as *Hollwedicerias* Jeletzky & Kemper, appear rather rarely. More often, these forms include *Varlheideites* Rawson & Kemper and *Prodichotomites* Kemper (Dziadzio et al., 2021), which are also found in the

southern basin (Thieuloy, 1977; Thieuloy et al., 1990; Reboulet, 1995). Boreal nanoplankton assemblages correspond well to the occurrence of these forms. In the latest Valanginian, the “borealization” of the ammonite fauna took place, expressed in the Wąwał profile by the mass occurrences of *Dichotomites evolutus* Kemper, coupled with the absence of other Mediterranean ammonites. On the other hand, there are no rapid changes in the assemblages of calcareous nanoplankton and foraminifera. There is a gradual decrease in their abundance and their condition deteriorates (Dziadzio et al., 2021). Despite the lack of Mediterranean ammonites, southern nanoplankton species occurred, some of them not known from the Lower Saxony Basin (Dziadzio et al., 2004). This may indicate that the connection with the Tethys Ocean still existed and that ammonites reacted more sensitively to change in water temperature than the planktonic microfossils. In other words, cooler waters and the environment associated with them could have been an effective barrier for Mediterranean ammonites, while nanoplankton was more tolerant in this regard. Another option is that the ammonite niche in the Polish Basin was occupied by representatives of *Dichotomites* that migrated from the Lower Saxony Basin. Such mass occurrence of more “aggressive” forms could be a barrier for Tethyan forms (Dziadzio et al., 2021).

4.7.1. *Saynoceras verrucosum* (d’Orbigny)

The study of the most abundant species in the Wąwał profile, *Saynoceras verrucosum* (d’Orbigny) (397 specimens studied), allowed for statistical studies and verification of earlier concepts concerning this species (Ploch, 2007). They indicate that the population of *Saynoceras verrucosum* (d’Orbigny) from the Polish basin (Wąwał section, central Poland) shows no significant intraspecific variability. Similar statistical analyses were made on the numerically rich material of *Saynoceras verrucosum* (d’Orbigny) from the Wąwał section as were used as for material from south-east France and south-east Spain (Bulot et al. 1990). However, in contrast to the results of those authors, the results from the present study showed a unimodal distribution, indicating the absence of dimorphism in the species *Saynoceras verrucosum* (d’Orbigny) associated with the occurrence of micro- and macroconchs of different sizes. Moreover, statistical analysis of specimens from the shallow, epicratonic Polish Basin and the relatively deep Vokontian Basin indicates that they represent two separate populations. The separation of the two populations may have resulted either from isolation or from different environmental conditions in the two basins (Ploch, 2007).

4.7.2. *Valanginites nucleus* (Roemer)

The study of the rich collection of *Valanginites nucleus* (Roemer) (242 specimens) from the Wąwał profile allowed for the revision of this species and the application of statistical studies. The detailed study showed that the species *Valanginites nucleus* (Roemer) is a polymorphic species, which exhibits three distinct morphotypes: *nucleus*, *wilfridi* and *ventrotuberculatum*. These morphotypes were described originally as species or subspecies: *Valanginites nucleus* (Koenen 1902, Kokoszyńska 1956, Witkowski 1969, Thieuly 1977, Kemper et al. 1981), *Valanginites wilfridi* (Karakash 1902, Kemper et al. 1981), and *Valanginites ventrotuberculatum* (Nikolov 1962, 1967, Dimitrova 1967, Riccardi and Westermann 1970, Kemper et al, 1981) . They are distinguished on the basis of different types of tubercles. Intermediate forms are present. The distinct *nucleus* morphotype is characterised either by gentle mid-lateral tubercles or no tubercles at all. The *wilfridi* morphotype has tubercles joined to the primary ribs, and the *ventrotuberculatum* morphotype has tubercles joined to primary ribs, as well as mid-ventral tubercles. Two types of forms are distinguished in all morphotypes, which are interpreted as sexual dimorphism. The dimorphism is expressed by differences in adult size, shape and number of ribs. Both in micro and macroconchs three morphotypes are recognisable.

4.7.3. Neocomitinae

In the Valanginian Wąwał section, ammonites are numerous and very well preserved, often with early whorls. This material provides new information and unique details for the study of the ontogeny and relationships within the Neocomitinae. The new study of Neocomitinae from the Polish Basin was based on the revision of existing collections and on new finds, mainly from the Wąwał section. Numerous and uniquely preserved ammonites allowed for the study of early and adult ontogenetic stages. Based on the similarity of the early stages, the close relationship between *Neohoploceras* Spath and *Karakaschiceras* Thieuloy is suggested, but their classification into the same genus is rather excluded. The early ontogenetic stages of *Neocomites* Uhlig differ from those in *Neohoploceras* Spath and *Karakaschiceras* Thieuloy. The earliest appearance of *Karakaschiceras* Thieuloy and *Neohoploceras* Spath in the Wąwał section may suggest that the Polish Basin was a site of their early development and beginning of their later evolutionary path. The earliest whorls of *Neohoploceras submartini* (Mallada) and *Neohoploceras arnoldi* (Pictet and Camp.) are identical, which indicates a very close relationship between these species. The ontogeny of

Neohoploceras brandesi (Koenen) was first described in Wąwał. Previous descriptions of this species were based only on fragments. The abundant presence of *N. brandesi* (Koenen) may indicate that the Polish Basin was an optimal place for their development. Even though representatives of the Neocomitinae have a widespread geographic distribution, the knowledge about them is still puzzling. This research improves our knowledge by providing new information for the future study of this group (Ploch, 2018).

4.7.4. Analyses of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$

Analyses of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ of the upper Valanginian (verrucosum to triptychoides zones) original ammonite shells preserved in clay from Central Poland were investigated for the first time. Analysis of the carbon stable isotope composition has shown diverse values, representing rather vital effects rather than recording the palaeoenvironment. In turn, analysis of the oxygen stable isotope composition clearly indicates the connection between particular species and the stable isotope ratio, and thus the palaeotemperature. The interpretation of ammonite palaeoecology is based on estimated palaeotemperatures and supports other interpretations of ammonite behaviour, mainly based on shell functional morphology. There are two main groups of ammonites associated with lower and higher temperatures. The first group of $\delta^{18}\text{O}$ values indicates lower palaeotemperatures. The analysed genera include *Bochianites*, *Dichotomites* and *Prodichotomites*, and a nekto-benthic (demersal) habitat is suggested for them. The second group characterised by higher palaeotemperatures includes *Saynoceras*, *Valanginites*, and *Olcostephanus*, with a suggested nektonic (or planktonic) habitat (free-floating), *Neohoploceras* and *Neocomites* with a suggested nektonic habitat (free-swimming) and a seasonal migration from warmer (Tethys) to cooler waters of the Polish Basin or lived in the Polish Basin for several summer and winter seasons. The co-occurring bivalves, echinoid spines and scaphopods were analysed for comparison with the results obtained from ammonites for a better overview of the palaeoenvironment. The estimated palaeotemperatures for the Polish Basin are from 12–13°C (at the sea bottom) to 21–24°C (in the upper water column), while for the Tethys or summer surface waters of the Polish Basin – in the range of 26–30°C.

The $^{87}\text{Sr}/^{86}\text{Sr}$ isotope value from the Upper Valanginian of the Polish Basin, slightly different from the estimated $^{87}\text{Sr}/^{86}\text{Sr}$ values for this age, can be interpreted as a result of the specific environment in the Polish Basin at that time (Ploch, 2022).

4.8. Hauterivian

The first Hauterivian ammonite zone is the *radiatus* Zone. It is documented by the appearance of *Leopoldia leopoldi* (d'Orbigny) in the core material from the Łowicz IG 1 well (Dziadzio et al., 2004). These strata were hitherto included in the Upper Valanginian (Marek, 1986). The state of preservation of the specimens from the Upper Valanginian described hitherto as *Leopoldia* sp. (Marek, 1969) does not allow for their generic determination (Dziadzio et al., 2004). The higher Lower Hauterivian zones, included in the so-called “Beds with *Endemoceras*”, are documented by the following species: *Endemoceras noricum* (Roemer), *Endemoceras* aff. *enode* Thiermann, and *Endemoceras* cf. *amblygonium* (Neumayer & Uhlig) (Raczyńska, 1979). Their good preservation allowed A. Raczyńska (1979) to correctly identify the specimens. On their basis, the *noricum* and *amblygonium* Zones were proposed (Dziadzio et al., 2004).

The Upper Hauterivian strata are documented by *Simbirskites* (*Craspedodicus*) cf. *gottschei* (Koenen) and *Simbirskites* (*Craspedodiscus*) sp. from the Żychlin IG 1 well (Raczyńska, 1979; Raczyńska, Marek, 1979). The sediments including them were attributed to the “Beds with *Simbirskites*” (Marek, Rajska, 1997). A well-preserved ammonite *Simbirskites gottschei* (Koenen) (determination by L. Karczewski, R. Marcinowski) was found in core material from the Korabiewice PIG 1 well, though, regrettably, the specimen is lost. The *gottschei* Zone was proposed basing on the findings of *Simbirskites gottschei* (Koenen) (Dziadzio et al., 2004).

4.9. Barremian, Aptian

The Barremian and Aptian deposits, hitherto considered as quite poor in macrofauna and treated jointly, contain incompletely preserved, scarce ammonites. A fragment of ammonite *Deshayesites* was found in a core from the Białobrzegi IG 1 well. It indicates the Lower Aptian (Dziadzio et al., 2004). This specimen was interpreted hitherto as *Endemoceras* sp. and attributed to the Lower Hauterivian (Marek, 1977). Other ammonite fragments are also known from the sedimentary successions described as Barremian–Aptian their age was suggested to be Aptian (Raczyńska, 1979). These findings indicate that the marine basin in the area of Poland was of open character (Dziadzio i in., 2004).

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5. Presentation of significant scientific or artistic activity carried out at more than one university, scientific or cultural institution, especially at foreign institutions.

University of Tübingen (Germany)

At the invitation of Prof. Zdzisław Bełka in 1999, I had the opportunity to conduct research on the collection of Lower Cretaceous ammonites gathered at the **University of Tübingen** [D1] and to learn about the methodology of oxygen and carbon isotope studies, useful for further studies of preserved aragonite ammonite shells.

University of Bochum (Germany)

At the invitation of Prof. Jörg Mutterlose, in 2000 I carried out comparative studies of the Lower Cretaceous ammonite fauna from Germany [D2], collected at the **University of Bochum** (Institut für Geologie, Mineralogie und Geophysik, Ruhr-Universität Bochum).

University Claude Bernard in Lyon, Institut Dolomieu in Grenoble (France)

At the invitation of Prof. Stéphane Reboulet, in 2000 and 2003 I conducted comparative studies of the Cretaceous ammonite fauna from France [D3], collected at the **University of Lyon** and , **Institut Dolomieu in Grenoble**.

Niedersächsisches Landesamt für Bodenforschung in Hannover (Germany)

At the invitation of Prof. Jörg Mutterlose, in 2001 I conducted comparative studies of the Lower Cretaceous ammonite fauna from Germany [D4], collected in the **Niedersächsisches Landesamt für Bodenforschung** and from private collectors in Hannover.

A grant funded by NATO [L4] enabled me to collaborate on paleoclimate research with the **Idaho National Laboratory INL (USA)**, the **University of Neuchâtel (Switzerland)**, and the **Israel Geological Survey (Israel)**. I collaborated with researchers studying the Lower Cretaceous paleoclimate from: Switzerland - Prof. Karl Föllmi, research at the

University of Neuchâtel in 2007; Israel - Dr. Amir Sandler, research at the Geological Survey of Israel in 2006; USA - Dr. Richard Rankin, research at INL in 2007. For collaborating scientists from Israel and Switzerland, research on Cretaceous outcrops in Poland was organized in 2006.

Bureau de recherches géologiques et minières – BRGM (France), Ministère des Mines et de l’Industrie - MMI (Senegal)

The research was carried out in the framework of a grant financed by FP7 [L7]. During the AEGOS (African – European Georesources Observation System) project in 2009-2011 I worked directly with Dr. Marc Urvois from **Bureau de Recherches Géologiques et Minières (BRGM), France**, who was the coordinator of the entire AEGOS project. Our African partner, with whom we led Working Group 4 (WP4- Preparation of innovative projects based on AEGOS) was MMI, where we cooperated directly with its current director Rokhaya Samba Diéné. This included the co-organization of the workshop in Dakar in 2010. We also cooperated directly with **Geologian Tutkimuskeskus (GTK), Finland** with Riitta Teerilahti; **Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Germany** with Markus Toloczyki; **Czech Geological Survey (ČGS), Czech Republic** with Dana Capova; **Beak Consultants (Beak), Germany** with Andreas Barth; **Council for Geoscience (CGS), South Africa** with Manie Brynard; Geology Department, School of Mines, **University of Zambia (GD-SOM-UNZA), Zambia** with Imasiku Nyambe; **Southern and Eastern African Mineral Centre (SEAMIC)** with Ketema Tadesse. The grant involved 9 European geological surveys; 8 African: geological surveys, ministries of mining, departments of mining; 4 international organizations: JRC, CIFEG, UEMOA, SEAMIC, and EuroGeoSurveys.

Museum of Natural History (USA)

A postdoctoral fellowship from the Kościuszko Foundation in 2011 [M2] enabled me to conduct research on the Upper Cretaceous ammonite fauna at the **Museum of Natural History in New York** under the supervision of Dr. Neil Landman.

EuroGeoSurveys (Association of the Geological Surveys of Europe)

During the implementation of the Geoscientific Knowledge And Skills of African Geological Surveys project in the years 2013-2016 I worked directly with Luca Demicheli, who was then the Head of **EuroGeoSurveys (EGS)**. EGS and PIG-PIB jointly coordinated

the entire project. The research was conducted as part of a grant financed by the European Commission [L10]. As a support of the technical coordinator, I worked directly with project participants: **Bureau de Recherches Géologiques et Minières (BRGM), France** – Jean-Claude Guillaneau, Dr Marc Urvois; **Czech Geological Survey (ČGS), Czech Republic** – Zdeněk Venera; **Instituto Geológico y Minero de España (IGME), Spain** – Enrique Díaz Martínez; **Sveriges Geologiska Undersökning (SGU), Sweden** – Rune Johansson; **Geological Survey of Denmark and Greenland (GEUS), Denmark** – John Tychsen; **Geological Survey of Lithuania (LGT), Lithuania** - Jonas Satkūnas; **Geological Survey of Italy (ISPRA), Italy** – Giuseppe Delmonaco; **Geological Survey of Finland (GTK), Finland** – Riitta Teerilahti.

Le Muséum national d'histoire naturelle (MNHN), Département Histoire de la Terre (France)

At the invitation of Dr. Jean-Sébastien Steyer, in 2012 I took part in Permian studies conducted by a team from the Muséum national d'histoire naturelle (MNHN) in Permian outcrops in southern France [M3].

International, bilateral grant on scientific and scientific-technical cooperation with foreign countries in 2014-2015 [L11] allowed for the implementation of cooperation on the research of the Lower Permian of the transboundary Intra-Sudetic Basin with the **Czech Geological Survey (ČGS)**. I cooperated with Dr. Zbyněk Šimůnek and Dr. Stanislav Čech.

An international research grant from the National Science Centre [L13] enabled me to conduct research at the **Urweltmuseum GEOSKOP** (Germany) at the invitation of Dr. Sebastian Voigt in 2022. I had the opportunity to conduct comparative research there on the Lower Permian tetrapod footprints from the Saar Basin, collected at the Urweltmuseum GEOSKOP. I also collaborated with the **Czech Geological Survey** (Dr. Zbyněk Šimůnek), **Geologický ústav Akademie věd České republiky, v. v. i.** (Dr. Jaroslav Zajíc) and the **Museum of Eastern Bohemia** in Hradec Králové (Dr. Stanislav Štanberg), the **University of Wrocław**, Faculty of Earth Sciences and Environmental Management (Dr. Paweł Raczyński, Dr. Marek Awdankiewicz), the **University of Warsaw**, Faculty of Biology (Mr. Wojciech Pawlak).

6. Presentation of teaching and organizational achievements as well as achievements in popularization of science or art.

6.1. Teaching achievements

During my doctoral studies at the Faculty of Geology of the University of Warsaw in 1998-2001, I taught students:

- full-time classes in historical geology (two semesters)
- field classes in the Holy Cross Mountains in: historical geology (one week), basic geology (two weeks) and geological cartography (three weeks).

After being employed at the Polish Geological Institute, the classes at the Geological Museum were mainly for school youth visiting the Museum. While working at the PIG Geological Museum in 2002-2012, I taught classes on Polish geology and the main deposits of rocks and minerals found in Poland. I also led workshops for school youth, title: *Recognizing fossils as a research tool* and *"How the stratigraphic table was created"*.

During the Science Festival in 2008-2011 I led workshops, title:

- *These tricky fossils, or how to recognize the inhabitants of the seas from millions of years ago,*
- *How the world has changed - invertebrate fossils as a research tool, - Traces of the ancient Earth - microfossils.*

In 2007-2009 I led a series of lectures on geology for teachers, organized by Wydawnictwa Szkolne i Pedagogiczne, title: *Why do we need a stratigraphic table?* and *The tracks of Polish dinosaurs and their latest finds, or geology with elements of paleontology in biology and geography lessons.*

6.2. Organisational achievements

6.2.1. Organization of exhibitions at the Geological Museum of the Polish Geological Institute-National Research Institute

2003 – organization of the exhibition entitled *(S)trwa dinosaurów*

2004 – co-authorship and organization of work on the exhibition entitled *Sulfur from Hell*

2005 – co-organization of the post-competition exhibition entitled *Catastrophes of Nature*

2006 – organization of the exhibition entitled *Traces of Spiny Dinosaurs*

2007 – co-authorship and organization of the exhibition entitled *Time of the Mammoth*

6.2.2. Organization of the Science Festival at the PGI-NRI Geological Museum

2004, 2005, 2008- 2011 - preparation and conducting of workshops as part of the Science Festival entitled: *These tricky fossils or how to recognize the inhabitants of the seas from millions of years ago, How the world changed - invertebrate fossils as a researcher's tool, Traces of the ancient Earth - macro fossils*. Preparation of information about the workshop published on the Science Festival website and printed in the guide about the Science Festival and information on the Institute's website about the Science Festival.

6.2.3. Organization of the Night of Museums at the PGI-NRI Geological Museum in the years 2005, 2007-2011, also including preparation of information about the event for the website and the guide on the Night of Museums.

6.2.4. Organization of congresses, scientific meetings (conferences), workshops

I was a member of the Organizing Committee of: the 2nd Polish Geological Congress in Warsaw in 2012 [K1] and the 3rd Polish Geological Congress in Wrocław in 2016 [K4], the celebration of the 100th anniversary of the Polish Geological Society in 2023, the 88th Scientific Congress of the Polish Geological Society in Dobczyce in 2024 [K7].

I was a member of the Organizing Committee - Workshop of the Berriasian Working Group in Warsaw in 2013.

I was the Chair of the Organizing Committee of:

- 83rd Scientific Congress of the Polish Geological Society in Biała Podlaska in 2014 [K2],
- 84th Scientific Congress of the Polish Geological Society in Chęciny in 2015 [K3],
- 86th Scientific Congress of the Polish Geological Society in Łuków in 2018 [K5].

I co-organized international workshops in Africa as part of the AEGOS [L7] and Geoscientific knowledge and skills in African Geological Surveys [L10] projects:

- AEGOS Workshop 3b/4b Dakar, Senegal, 11-13 October 2010 [J12],
- AEGOS Workshop Lubumbashi, DR Congo, 28-30 March 2011 [J14],
- EGS/OAGS Workshop Accra, Ghana, 25 September 2013 [J15].

6.2.5. Project management

1999–2000 grant from the State Committee for Scientific Research (KBN) for young researchers, entitled: The problem of sexual dimorphism as a manifestation of intraspecific variability in Valanginian ammonites from Wąwał (Tomaszów Basin) [C1].

2003–2004 grant from the National Fund for Environmental Protection and Water Management, no. 159/2003/Wn-50/EE-BS/B, entitled: Ecological education on the Internet. Using the resources of the PIG Geological Museum for educational purposes [L1].

2005–2007 grant from the Provincial Fund for Environmental Protection and Water Management in Kielce, no. 105/05, entitled: Ecological education based on sites with dinosaur tracks in the Świętokrzyski region [L3].

2007-2010 research grant from the Ministry of Science and Higher Education, no. N525 032 32/3063, entitled: Scientific research and popularization of knowledge about the abiotic environment based on sites with dinosaur tracks [L6].

2014-2015 conducting a research grant from the Ministry of Science and Higher Education, no. 9020/R14/R15, entitled: Geopark Niecki Śródsudeckiej-cross border area of Polish-Czech cooperation [L11].

I also managed smaller research grants: R1-R5, R7-R11, R13, R16, R18, R19, R 20, R21.

6.2.6. Positions held at PIG-PIB

From 2002 to 2003 I was the **Curator of the collections of the PGI-NRI Geological Museum** and then, until 2009, **Deputy Head of the Museum and Head of the Education Workshop of the PGI Geological Museum.**

6.3. Achievements popularizing science

6.3.1. Author and co-author of popular science publications

- **Series of educational publications entitled Świętokrzyski Jurassic Park:**

Gierliński G., Sabath K., **Ploch I.** 2006. Tracking Dinosaurs in the Holy Cross Mountains. Tourist Guidebook. Polish Geological Institute. pp. 16.

Gierliński G., Sabath K., **Ploch I.** 2006. Świętokrzyski Park Jurajski. Informator turystyczny. Publikacje Państwowego Instytutu Geologicznego 16 str.

Gierliński G., Sabath K., **Ploch I.** 2006. Świętokrzyski Park Jurajski. Przewodnik dla uczniów szkół podstawowych (32 str.), gimnazjów (32 str.), liceów (32 str.), Publikacje Państwowego Instytutu Geologicznego.

Gierliński G., Sabath K., **Ploch I.** 2006. Świętokrzyski Park Jurajski. Materiały do ćwiczeń dla uczniów szkół podstawowych (4 str.), gimnazjów (4 str.), liceów (4 str.), Publikacje Państwowego Instytutu Geologicznego.

- Scientific editing of the popular science **Stratigraphic Table–History of Life on Earth** in 2005–2007, published with the funds of the National Fund for Environmental Protection and Water Management.

• **List of popular science articles**

Iwańczuk, J., Woroncowa-Marcinowska, T., **Ploch, I.** 2008. Otwarcie Muzeum Ziemi im. Karola Sabatha — Solec Kujawski, 24.05.2008. *Przegląd Geologiczny* vol 56, nr. 08/2: 733-744, 787-788.

Ploch, I. 2008. Warszawa – warsztaty w Muzeum Geologicznym. *Wiadomości Państwowego Instytutu Geologicznego* 4/2008 (197).

Jackowicz, E., Jaworowski, K., Mizerski, W., Pieńkowski, G., **Ploch, I.**, Woroncowa-Marcinowska, T. 2009. Muzeum Geologiczne Państwowego Instytutu Geologicznego 1919-2009. Publikacje Państwowego Instytutu Geologicznego *pp.* 1-93.

Ploch, I. 2009. Działalność dydaktyczno-popularyzatorska Muzeum Geologicznego Państwowego Instytutu Geologicznego. Monografia pod redakcją Jakubowski, K. J., Skoczylas, J., Ziomek, J. Akademyckie muzea geologiczne w upowszechnianiu wiedzy o Ziemi. 141-146. ISBN 978-83-7525-293-4

Graniczny, M., Gogołek, W., **Ploch, I.**, Urban, H. 2011. Fascynująca geologia Tanzanii. *Przegląd Geologiczny*, vol. 59, nr. 8: 561-565, 592.

Ploch, I. 2009. XIII Festiwal Nauki w Warszawie. *Wiadomości Państwowego Instytutu Geologicznego* 3/2009 (201)

Graniczny, M., Koźma, J., **Ploch, I.** 2013. Nowy transgraniczny polsko czeski projekt. *Aktualności PIG-PIB* <http://www.pgi.gov.pl/pl/instytut-geologiczny-aktualnosci-informacje/4719-polacy-i-czesi-koordynuj-dziaania-na-rzecz-utworzenia-geoparku-niecki-roadsudeckiej.html>

Mroczek, P., **Ploch, I.**, Świerczewska-Pietras, K. 2014. 83 Zjazd Naukowy PTG. *Aktualności PIG-PIB* <http://www.pgi.gov.pl/pl/instytut-geologiczny-aktualnosci-informacje/5278-83-zjazd-polskiego-towarzystwa-geologicznego.html>

Konon, A., **Ploch, I.** 2015. 84 Zjazd Naukowy PTG. *Aktualności PIG-PIB* <http://www.pgi.gov.pl/pl/instytut-geologiczny-aktualnosci-informacje/5617-84-zjazd-polskiego-towarzystwa-geologicznego>

Ploch, I. 2020. Badamy permskie baseny w międzynarodowym zespole. *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/12080-badamy-permskie-baseny-w-miedzynarodowym-zespole.html>

Ploch, I., Grabowski, J., Lodowski, D. 2022. Co geolodzy robią w beriasie i walanżynie Francji? *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/13669-co-geolodzy-robia-w-beriasie-i-walanżynie-francji.html>

Ploch, I., Grabowski, J., Iwańczuk, J. 2022. Słowacko-Czesko-Polska Konferencja Paleontologiczna. *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/13650-21-slowacko-czesko-polska-konferencja-paleontologiczna.html>

Ploch, I., Grabowski, J., Lodowski, D. 2023. Relacja z 11. Międzynarodowego Sympozjum Kredowego w Warszawie. *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/13848-relacja-z-11-miedzynarodowego-sympozjum-kredowego-w-warszawie.html>

Ploch, I., Grabowski, J. 2023. Odwierty geotermalne pomagają w badaniach paleoklimatu. *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/14189-odwierty-geotermalne-pomagaja-w-badaniach-paleoklimatu.html>

Ploch, I. 2023. Czego szuka geolog zimową porą? *Facebook PIG-PIB* <https://pl-pl.facebook.com/pigpib/>

Ploch, I., Sikora, R. 2023. PIG-PIB współorganizatorem 88. Zjazdu PTGeol! *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/14509-pig-pib-wspolorganizatorem-88-zjazdu-ptgeol.html>

Ploch, I. 2023. Zjazd Naukowy PTGeol . *Facebook PIG-PIB* <https://pl-pl.facebook.com/pigpib/>

Ploch, I., Pawlak, W., Baranowski, A. 2024. Ważne odkrycie permskiego płaza. *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/15296-wazne-odkrycie-permskiego-plaza.html>

Baranowski, A., Ploch, I. 2024. Eksperci PIG-PIB na Konferencji PALGES 2024. *Aktualności PIG-PIB* <https://www.pgi.gov.pl/aktualnosci/display/15575-eksperci-pig-pib-na-konferencji-palges-2024.html>

- **Popular science study of 34 geosites from 2010-2011, made available in the Central Database of Geosites in Poland.**

Geostanowiska: Biała Góra, Jaskinie Nagórzyca , Kamieniołom Mroczków, Kamieniołom Portland, Kamieniołom Inowłódź, stanowisko Potok, źródło Tuwima, stanowisko Wąwał, góra Młynarka, Bochoznica, góra Chełma, stanowisko Janików, kamieniołom Lisowice, Kamieniołom Sielec, Kamieniołom Trebaczew, Kamieniołom Kazimierz Dolny, Kamieniołom Nasiłów, Kamieniołom Opoczka, Kamieniołom Piotrawin, Kamieniołom rezerwat Węże, Kamieniołom złoża Chełsty, Kamieniołom złoża Paszkowice, Gorzuchów, Bierkowice, Ścinawka Dolna, Tłumaczów Grudzień, Kamieniołom Piaskowiec Czerwony, wodospad Pośny, Skalne Wrota, Narożnik, Berło Duch Gór, Rogacz, Dzik, Zakład Kopalni Piaskowca Radków.

- **Popular science lectures and posters**

- Author of a poster for Earth Days in 2010 entitled *Journey into the Depths of Time – Changes Occurring on Earth*.
- Lecture in Polish and English during the first European EarthCache Event, co-organized by PGI-NRI, Geological Society of America (GSA), City of Zabrze, Guido Mines in 2014, entitled *Walking with Polish dinosaurs*.

- **Popular science appearances on television, radio and other media**

Popular science appearance on TVN **Meteo** in 2008 on climate change caused by volcanic eruptions.

Appearance on **TVP 1** in Radosław Brzózka's popular science program – "*How it works*"

- In 2017, the episode entitled *Detektywi przeszłości* <https://vod.tvp.pl/programy,88/jak-to-dziala-odcinki,273985/odcinek-146,S01E146,1625761>
- In 2018 the episode entitled *Ewolucja* <https://vod.tvp.pl/programy,88/jak-to-dziala-odcinki,273985/odcinek-156,S01E156,1625817>

Popular science appearance on **local television in Koło** about scientific research conducted on material from the Koło GT 2 borehole in 2023. Link to the program

http://tv.kolo.pl/programy/2022/326_badania.webm

Radio357, popular science broadcast Patronautyka, 09.2024,

host Patrycjusz Wyżga, guest of the program–Izabela Ploch

Link to the program <https://radio357.pl/podcasty/audycje/patronautyka/odcinek/505875/>

Program Pierwszy Polskiego Radia, popular science broadcast Eureka, 07.2024,

entitled: "*Paw and tail traces of an amphibian from 300 million years ago. An important discovery in Lower Silesia*", host–Katarzyna Kobylecka, guest of the program–Izabela Ploch

Link to the program <https://jedyinka.polskieradio.pl/artykul/3406314,Odciski-%C5%82ap-i-ogona-p%C5%82aza-sprzed-300-milion%C3%B3w-lat-Wa%C5%BCne-odkrycie-na-Dolnym-%C5%9A1%C4%85sku->

Newspaper **Nowaruda24**, 8 (1421), 15.08.2024

title: "*A sensation on a global scale. A breakthrough discovery in Nowa Ruda*", Marcin Rosiński, number of pages 1

Nauka Polska, 07.08.2024

title „*Plaz sprzed 300 mln lat z ogonem pokrytym łuskami – nowy trop w temacie ewolucji*” „*300-million-year-old amphibian with scaled tail - new clue in evolution*”, Agnieszka Kliks-Pudlik

Link to the article <https://naukawpolsce.pl/aktualnosci/news%2C103745%2Cplaz-sprzed-300-mln-lat-z-ogonem-pokrytym-luskami-nowy-trop-w-temacie>

Ars Technica, 27.06.2024

title “*Scales helped reptiles conquer the land—when did they first evolve?300 million-year-old tail print shows that scales evolved earlier than expected*”, Jeanne Timmons

Link to the article <https://arstechnica.com/science/2024/06/scales-helped-reptiles-conquer-the-land-when-did-they-first-evolve/>

• Exhibitions

- Co-author of the exhibitions entitled Sulfur from Hell in 2004 and entitled Time of the Mammoth in 2007 at the Geological Museum of the Polish Geological Institute-National Research Institute.
- Development of the scenario for the regional lapidarium in Radków in 2020.

• Online lessons

Author of the online lesson entitled *A trip around Polish volcanoes*. The Geological Museum of the Polish Geological Institute-National Research Institute in 2004.

7. Apart from information set out in 1-6 above, the applicant may include other information about his/her professional career, which he/she deems important.

In addition to the research topics presented in the series of publications that make up the entire work, during my scientific career I also dealt with topics such as:

- **Study of Permian tetrapod tracks, paleoenvironment and stratigraphy of the Lower Permian.** The beginning of my interest in this subject was associated with the implementation of a project with the Ministry of Science and Higher Education [L6], when in 2008 I began studying tetrapod tracks from the Intra-Sudetic Basin. I obtained further national and international projects to continue my work on these issues [L11, L13, R1]. The results of the research were presented at national and international conferences [I 7, I8, I14, I 15, J11, J18, J19, J21, J22], in scientific articles [G23, G28, G30, G31] and in interviews and popular science articles discussed in section 6.2.1.
- I carried out work related to the issues of **African geology** within the international AEGOS program [L7] in 2009-2011 and then the Geoscientific knowledge and skills in African Geological Surveys program, in 2013-2014. The results of the work were presented as papers during working meetings and conferences [J9, J10, J12, J13, J14, J15, J16]. The results of the work are also the final reports for the EU Commission, of which I was a co-author, including: D4.3 Proceedings of workshop 4b - Review of spin-off projects based on AEGOS, preparation of a road map for AEGOS test beds; D4.4 Project proposals based on AEGOS, dedicated to georesources; D4.5 Road map for AEGOS test beds.
- I was delegated by the Ministry of the Environment in 2017-2018 to provide expert support in preparations for the Polish presidency of COP 24. I was the **Polish leading expert on adaptation to climate change** at: the United Nations Conference on Climate Change - 23rd Conference of the Parties to the United Nations Framework Convention on Climate Change, 13th session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP), 2nd session of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA). I was an expert on adaptation to climate change at: the United Nations Conference on Climate Change 24th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP), 14th session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP), 3rd session of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA). I was responsible for preparing professional assessments, analyses and guidelines; I participated in meetings of COP bodies

(Expert Group on Adaptation (EGA), Adaptation Committee); during the COP my scope of work included: Adaptation Committee (AC) report, issues related to least developed countries, National Adaptation Plans (NAP), adaptation communication. The result of transferring my experience to the field of geology is the article [G20].

In 2006 I obtained a certificate in project management: **PRINCE2® Foundation Certificate in Project Manage**

Awards and distinctions received:

- 2007 Special Award of the Director of the Polish Geological Institute for a series of educational publications entitled Świętokrzyski Jurassic Park,
- 2017 Honorary Badge "MERIT FOR POLISH GEOLOGY",
- 2022 Decoration by the President of the Republic of Poland with the Bronze Cross of Merit,
- 2024 Golden Badge of the Polish Geological Institute.

Summary of achievements:

My achievements include a total of 36 publications, of which 26 are indexed in the Scopus database and 17 in the Web of Science database. Seven of the indexed publications are included in the presented achievement. The total current IF of the publications included in the achievement is 12.7; and the total IF of all my publications is 38.5. The articles included in the achievement have been cited a total of 53 times (41 without self-citations) according to the SCOPUS database and 22 times (18 without self-citations) according to the Web of Science database. The cumulative citation index of all my articles is 577 (554 without self-citations) according to the SCOPUS database and 398 (382) according to the Web of Science database. I am the author and co-author of 32 presentations at scientific conferences, 21 of them at international conferences. 30 presentations were given after I received my Ph.D. In addition to the oral presentations, I personally presented 9 posters (8 postdoctoral). In the years 2011-2024, I wrote 4 reviews of articles for international scientific journals and one review of the chapter of the international scientific book

.....*Małgorzata Ploch*.....
(Applicant's signature)