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Palynological Zones of the Polish Epicontinental Triassic

by

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Summary. The paper presents a description of palynological assemblage zones and subzones distinguished in Triassic epicontinental sediments of Poland. Microflora of Lundbladispora obsoleta–Protohaploxypinus pantii zone found in the Lower Buntsandstein deserves special attention. That microflora, so far unknown in Europe, has been correlated with the microfloristic association of "Protohaploxypinus" reported from Griesbachian of Greenland [5] and northern Canada [10]. On this basis the described zone has been classified as the oldest Triassic one. An attempt has also been made to define the age of the described zones according to chronostratigraphic scheme.

The Triassic strata of Poland were laid down in the eastern part of an epicontinental basin which occupied the area of Central Europe (Fig. 1). Continental or lagoonal facies dominated in this area and the facies of epicontinental sea existed only in the middle part of the Triassic. Miospores, temporarily occurring together with acritarchs, are important for the stratigraphy of the Triassic strata of Poland. Assemblage zones and subzones have been distinguished on the grounds of the appearance and frequence of individual miospore species. The zones enable distinction and correlation of lithostratigraphic units in various regions of Poland with contemporaneous epicontinental strata abroad. An attempt was made toward determination of the age of the distinguished zones according to the chronostratigraphic scheme, and in this way to relate the lithostratigraphic division applied in Poland to the standard classification (Fig. 2). Many difficulties were due to the occurrence of palynologically barren strata, due to the lack in the literature of the data on microfloras of some well documented standard stages and substages, and due to the often problematic position of boundaries between some stages in the standard classification.

The oldest Triassic zone established in Poland [24] is the assemblage Lundbladispora obsoleta–Protohaploxypinus pantii zone (Fig. 2). The characteristic

feature of this zone is the appearance of the spore genera *Lundbladispora*, *Densoisporites*, and *Kraeuselisporites*, concurrent with the continuing from the Upper Permian bisaccate, striated pollen grains of genera *Protohaploxypinus*, *Strotersporites*, *Taeniaesporites* and *Striatopodocarpites*. Noteworthy is the absence in this assemblage of *Lueckisporites virkkiae* Potonié and Klaus, the index species for the Upper Permian, represented by palynological norms A, B and C, according to the scheme of Visscher [39].

The disappearance of this species and the appearance of lycopod genera *Densoisporites* and *Lundbladispora* is accepted as a base for the distinction of the oldest Triassic zone. The spores appearing in this zone belong to the species: *Lundbladispora obsoleta* Balme, *L. willmotii* Balme, *Densoisporites playfordi* (Balme) Dettmann, *Kraeuselisporites cuspidus* Balme and *Endosporites papillatus* Jansonius. Of the pollen grains, the species *Protohaploxypinus pantii* (Jansonius) Orl.–Zwol. (accepted as the second nominal species of the assemblage (continuing from the Upper Permian, occurs regularly and abundantly in this assemblage. Less numerous are *Strotersporites richteri* (Klaus) Wilson, *Taeniaesporites noviaulensis* Leschik, *Protohaploxypinus pellucidus* Goubin, *P. samoilovichii* (Jansonius) Hart, *Cycadopites follicularis* Wilson and Webster, and others.

The next assemblage—Densoisporites nejburgii zone—is distinguished in Poland [24] in the middle Buntsandstein strata. It comprises three successive subzones: Densoisporites nejburgii–Acritarcha (PI), Densoisporites nejburgii (PII) and Cycloverrutriletes presselensis (PIII).

The Densoisporites nejburgii–Acritarcha subzone is characterized by the first appearance of the nominal species, relatively low percentage of spores, and concurrence of relatively numerous acritarchs.

The Densoisporites nejburgii subzone is distinguished by the dominance of the nominal species. Dispersed miospores of *Densoisporites nejburgii* (Schulz) Balme show morphological similarities to *Pleuromeia rossica* Neuburg miospores. Their plentiful occurrence in the sediments evidences a rich vegetation of arborescent lycopods *Pleuromeia rossica* Neuburg during that period. Concurrent with it are the species: *Densoisporites playfordi* (fairly numerous), *Lundbladispora brevicula* Balme, *Endosporites papillatus* Jansonius. Miospores *Punctatisporites triassicus* Schulz, *Cyclotriletes oligogranifer* Mädler, *C. microgranifer* Mädler appear here. Of the pollen grains noteworthy are: *Protohaploxypinus pellucidus* Goubin (fairly numerous), *Platysaccus leschiki* Hart, *P. papillionis* Potonié and Klaus, *Taeniaesporites noviaulensis* Leschik, *Cycadopites follicularis* Wilson and Webster.

The Cycloverrutriletes presselensis subzone is distinguished by a microflora with features in common with that of the underlying subzone, because of numerous occurrence of the genera *Densoisporites* and *Lundbladispora*.

This microflora is distinguished by the appearance and numerous and regular occurrence of *Cycloverrutriletes presselensis* Schulz.

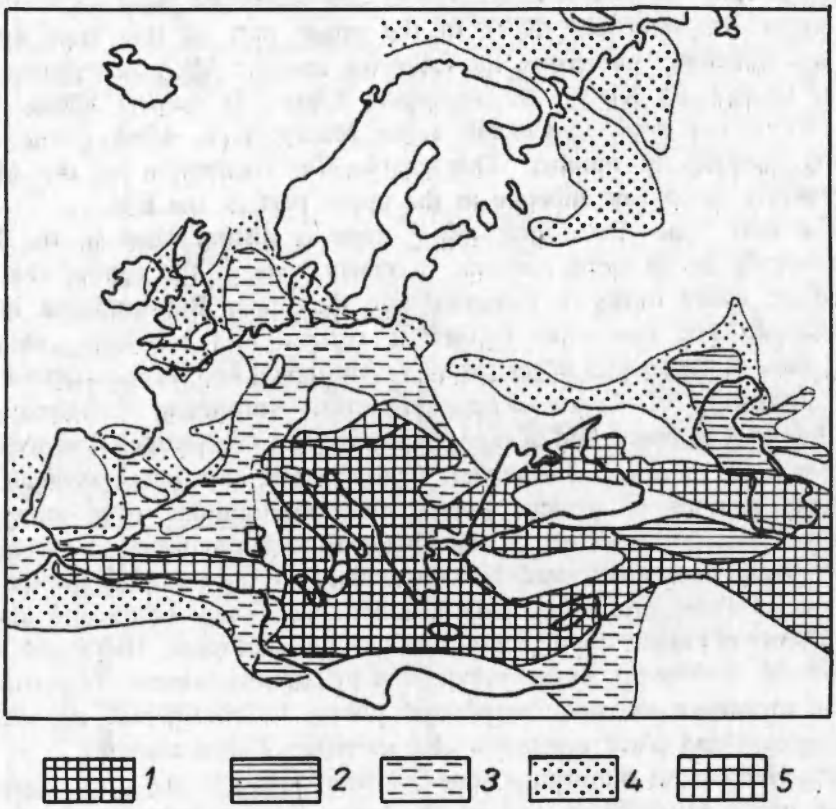

Fig. 1. Palaeotectonic-palaeogeographic map of the European Triassic (after Brinkmann, considerably supplemented)

1—marine geosynclinal facies from the Lower Triassic onwards. 2—marine epicontinental facies from the Lower Triassic onwards. 3—continental-lagoonal facies with marine ingressions from the Rot onwards (German facies with tripartite Triassic). 4—pure continental-lagoonal facies from the Lower Triassic. 5—marine geosynclinal facies, developing during the Triassic

The Voltziaceaesporites heteromorpha zone is distinguished within the upper Buntsandstein [24]. The microflora of this zone is characterized by distinct and more differentiated species composition relative to the zone Densoisporites nejburgii. Pollen grains outnumber the spores. These are mostly pollen grains of *Striatites* indicative of plant vegetation dependent on warm and arid climate. The pollen grains are represented by the following taxa: *Succinctisporites grandior* Leschik *sensu* Madler, *Angustisulcites klausii* Freudenthal, *A. gorgii* Visscher, *Striatoabietites balmei* Klaus, *Protohaploxypinus samoilovichii* (Jansonius) Hart, *Brachysaccus ovalis* Madler, *Hexasaccites muelleri* (Reinhardt and Schmitz) Reinhardt, as well as the multispecies

genus *Triadispora*. Among the spores the following deserve mention: *Aratrisporites tenuspinosus* Playford, *Cyclotriletes triassicus* Mädler, *Kraeuselisporites ullrichi* Reinhardt and Schmitz, *Verrucosisporites thuringiacus* Mädler and others. Despite the general uniformity of this microflora in all the section of the upper Buntsandstein (Röt), in the upper part of this zone appear, and are sometimes numerous, the following species: *Microcachryidites fastidiosus* (Jansonius) Klaus, *M. doubingeri* Klaus, *M. sittleri* Klaus, while *Succinctisporites grandior* Leschik *sensu* Mädler (syn. *Illinites chitonoides* Klaus) increases in number. This enables the distinction of the Microcachryidites fastidiosus subzone in the upper part of the Röt.

The next zone—Perotrilites minor zone is distinguished in the lower Muschelkalk or, in some sections, in marly beds at the top of the Röt. There are many forms in common with the upper Buntsandstein in this assemblage. The distinctive feature is regular and relatively numerous occurrence of *Perotrilites minor* (Mädler) Antonescu and Taugourdeau-Lantz, the appearance of *Concentricisporites nevesi* Antonescu, *Cristianisporites triangulatus* Antonescu, and of numerous acritarchs. The latter are represented by genera *Veryhachium*, *Tasmanites*, *Leiosphaeridia* and *Micrhystridium*, and in some sections of western Poland they predominate over miospores.

The Tsugaepollenites oriens assemblage zone distinguished in the middle Muschelkalk, is characterized by concurrence of the nominal species with the species *Perotrilites minor* (Mädler) Ant. and Taug.-Lantz and also by concurrence of numerous pollen grains of genera *Triadispora*. *Microcachryidites* (mainly *M. doubingeri*), *Angustisulcites* and by complete absence of acritarchs. The composition of this assemblage points to continental depositional environment and plant vegetation characteristic of arid climate.

The Heliosaccus dimorphus zone is distinguished in the uppermost part of the upper Muschelkalk and in the lower Keuper (without the Grenze Dolomit) [23]. This microflora is clearly distinct from the microflora of the middle Muschelkalk (the lower part of the upper Muschelkalk is palynologically sterile). Numerously occur the spores of the multispecies genus *Aratrisporites*, *Todisporites*, *Verrucosisporites*, *Cyclotriletes*, *Anapiculatisporites*, pollen grains *Minutosacus potoniei* Mädler, *M. gracilis* (Scheuring) Orlowska-Zwolińska, *Succinctisporites grandior* Leschik *sensu* Mädler, *Brachysaccus neomundanus* (Leschik) Mädler and others.

The lower part of the described zone is distinguished as the subzone with Tasmanites in the upper part of the upper Muschelkalk, because of the large proportion of acritarchs of the genera: *Leiosphaeridia*, *Tasmanites*, *Veryhachium*, *Crassosphaera*, *Micrhystridium-Baltisphaeridium*. The higher part of this zone, devoid of marine microplankton, is characteristic of the lower Keuper, containing already some species of limited extent as *Palaeospongisporis europaeus* Schulz, *Keuperisporites bacculatus* Schulz.

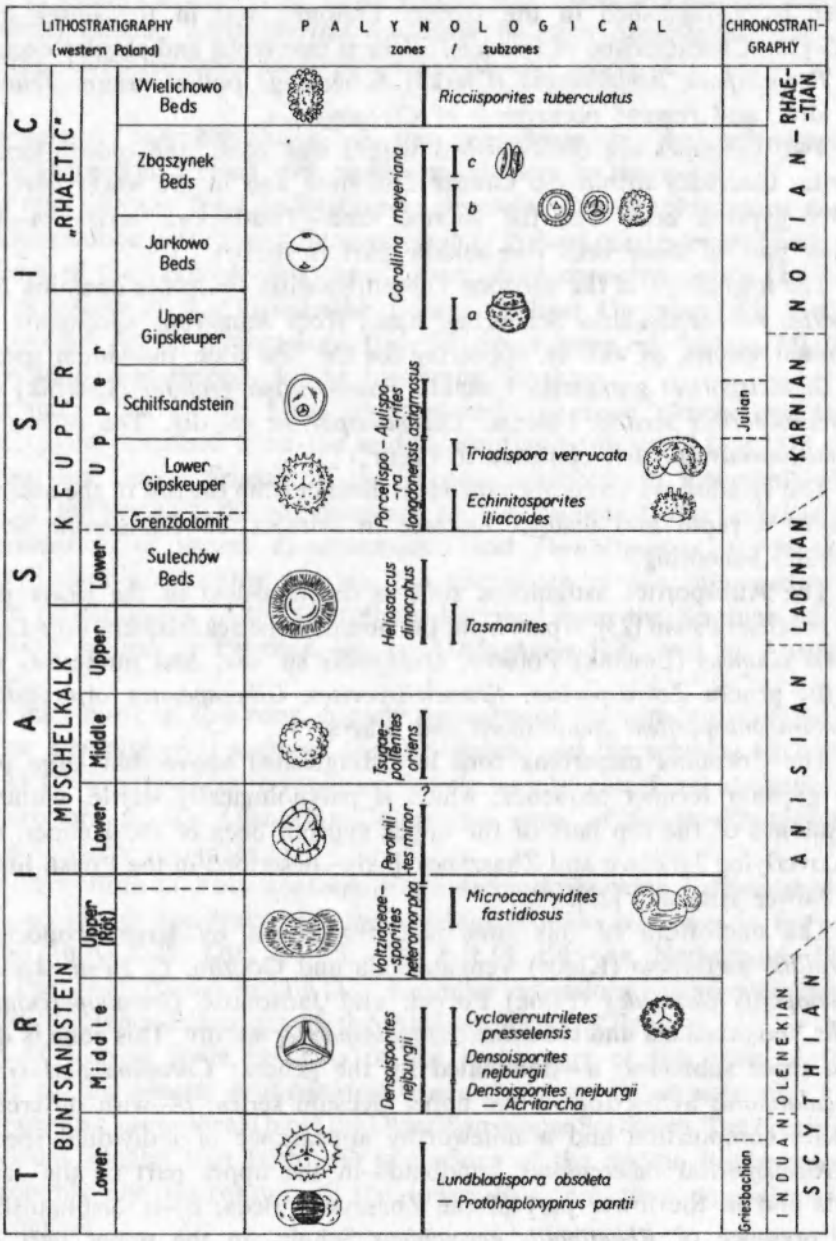

Fig. 2. Palynological zones and subzones distinguished in Triassic sediments of Poland

The next in the microfloral succession, the Porcelispora longdonensis zone, is distinguished in the Grenze Dolomit and in the lower gypsum beds [23]. Characteristic of this microflora is numerous and regular occurrence of *Porcelispora longdonensis* (Clarke) Scheuring, pollen grains *Triadispora* sp. div., and regular occurrence of *Circumpolles*.

Two subzones are distinguished within this zone: the older—Echinitosporites iliacoides within the Grenze Dolomite and in the lower part of the lower gypsum beds, and the younger one—Triadispora verrucata—in the upper part of these beds (the middle part is sterile).

The microflora of the subzone Echinitosporites iliacoides contains *Eucommiidites microgranulatus* Scheuring, apart from numerous specimens of the nominal species, as well as, appearing for the first time, individual specimens of *Duplicisporites granulatus* Leschik, *Praecirculina granifer* (Leschik) Klaus, *Camerosporites secatus* Leschik, *Enzonalasporites* sp. div. The pollen grains *Minutosaccus* sp. div. continue to occur.

The Triadispora verrucata subzone is distinct from the rest of the assemblage due to a rapid and distinct increase in number of *Triadispora verrucata* (Schulz) Scheuring.

The Aulisporites astigmosus zone is distinguished in the lower part of the Schilfsandstein [23]. Apart from the nominal species frequent are: *Leschikisporis aduncus* (Leschik) Potonie, *Ovalipollis* sp. div. and numerous species of the genera *Zebrasporites*, *Kraeuselisporites*, *Gibeosporites*, *Apiculatisporis*, *Camarozonosporites*. *Annulispora* and others.

The Corollina meyeriana zone is distinguished above that large part of the gypsum Keuper sequence, which is palynologically sterile, within grey claystones of the top part of the upper gypsum beds of the Keuper, and in the overlying Jarkowo and Zbąszynek Beds—described in the Polish literature as "lower Rhaetic" [23].

The microflora of this zone is characterized by large proportion of *Corollina meyeriana* (Klaus) Venkatachala and Góczán, *C. zwolinskai* Lund, *Classopollis classoides* (Pflug) Pocock and Jansonius, *Granuloperculatipollis rudis* Venkatachala and Góczán, *Enzonalasporites* sp. div. This zone is divided into three subzones: *a*—dominated by the genera: *Corollina* and *Granuloperculatipollis* at the top of the upper gypsum series; *b*—with differentiated species composition and a noteworthy appearance of individual specimens of *Ricciisporites tuberculatus* Lundblad—in the upper part of the Jarkowo Beds and in the lower part of the Zbąszynek Beds; *c*—is distinguished by the presence of *Rhaetipollis germanicus* Schulz—in the upper part of the Zbąszynek Beds.

The Ricciisporites tuberculatus zone includes the microflora of the Wielichowo Beds—"upper Rhaetic" according to the lithostratigraphic division used in Poland. This zone is dominated by *Ricciisporites tuberculatus*,

Lundblad, accompanied by the index species like *Triancoraesporites ancorae* (Reinhardt) Schulz, *Limbosporites lundbladii* Nilsson, *Semiretisporis gothae* Reinhardt, *Cornutisporites seebergensis* Schulz and others [23].

Comparison and correlation of the microfloras of the palynological zones established in Poland with similar microfloras in the world.

The microflora of the Lundbladispora obsoleta—Protohaploxypinus pantii zone distinguished in the lower Buntsandstein of Poland correlates well with the microflora of the "Protohaploxypinus" association concurrent with Otoceras in the deposites of the Griesbachian stage in East Greenland [5] and in the Canadian Arctic Archipelago [10]. In the scheme of Tozer [33], the Griesbachian stage belongs to the lowermost Scythian.

The microflora of the Densoisporites nejburgii zone closely resembles the microflora described from the middle Buntsandstein of G.D.R. [27, 29] and from the Lower Triassic of the Moesian platform in Roumania [35]. A similar tendency in the development of the Triassic floras, marked by the domination of spores *Lundbladispora* and *Densoisporites*, is observed in very distant areas. Due to this, the microflora of the discussed zone can also be compared to the microflora described from the Scythian of the Salt Range section in Pakistan [4], on Madagascar [12], and in Australia [3, 7, 14].

The microflora of this zone, namely the subzone PII with the domination of spores *Densoisporites nejburgii* (Schulz) Balme and the subzone PIII with spores of *Cycloverrutriletes presselensis* Schulz may be correlated already with the microflora of the Olenekian–Columbites zone of South Mangyshlak [6], and Moscow Syneclize [15].

The microflora of Voltziaceaesporites heteromorpha zone distinguished in the Röt correlates positively with coeval floras of many countries in Europe, especially in G.D.R. [20, 25, 28, 29], F.R.G. [9], the Netherlands [11], eastern France [1], Great Britain [31]. A similar microflora has been described from the Werfener Schichten of the Alps by Klaus [17].

Out of Europe some elements of the lower part of this zone, as the presence of the genera *Aratrisporites*, *Angustisulcites*, *Triadispora* and *Voltziaceaesporites*, are reported from the Olenekian (upper Scythian). The presented comparisons suggest that both, the microflora of the middle Buntsandstein and probably the microflora of the lower Röt, are time equivalents of the Olenekian.

Nevertheless, it is difficult now to draw the boundary between the Scythian and Anisian in the palynological sense, due to divergent opinions expressed in the literature. The microflora of the Voltziaceaesporites heteromorpha zone can be dated as Spathian (upper Scythian) by analogy to the microflora distinguished by Fisher [10] in the Canadian Arctic Archipelago.

A contrary conclusion stems from the reference of this microflora to the scheme of Visscher and Brugman [40]. According to these authors, characteristic of the Spathian are the species *Densoisporites nejburgii* (Schulz) Balme and *Cycloverrutriletes presselensis* Schulz which determine the microflora of the middle Buntsandstein in the Polish sections. In this approach the microflora of the Voltziaceaesporites heteromorpha zone would correspond as a whole to the Anisian.

Comparison of this microflora to that of the Rot of F.R.G., studied by Doubinger and Büchmann [9] suggests that the lower part of this zone, distinguished in the lower Rot, corresponds to the association I, dated as upper Scythian, while the upper part of this zone, with *Microcachryidites* grains, corresponds to the association II, dated as Anisian. This conclusion is also corroborated by the resemblance of the microflora with *Microcachryidites* to the microflora Upper Bunter-Grès Voltzia in Alsace, formerly conventionally regarded as late Scythian, and recently dated as Anisian. On the other hand, the Olenekian (Scythian) flora lacks the *Microcachryidites* grains, in accordance with the suggestions presented above.

Thus the problem of the Scythian–Anisian boundary seems to remain open. It is possible that this boundary should be drawn at the beginning of Voltziaceaesporites heteromorpha zone (Rot) or at the appearance of the *Microcachryidites* grains, i.e. at the boundary between the lower and the upper Rot.

The Perotrilites minor assemblage displays features of the assemblage of the lower Muschelkalk over the epicontinental areas of Europe, i.e. in France [32] and in Germany [20].

The microflora of the next, Tsugaepollenites oriens zone, contains elements in common with the microflora of the middle Muschelkalk of France [17].

The microfloras of both mentioned zones correlate with the microflora of the faunistically documented Anisian of the Eastern Carpathians [2].

The microflora of the Heliosaccus dimorphus zone, found in the upper part of the upper Muschelkalk and lower Keuper, is commonly described as Ladinian in age.

The Porcelispora longdonensis zone, distinguished above, was determined by the author as corresponding to the Karnian. This conclusion is based on the appearance of pollen grains *Circumpolles*, until recently considered to be characteristic of the Karnian [16], and on a sudden increase in frequence of *Ovalipollis* sp. div. Now, when it appeared that the group *Circumpolles* occurs already in the Ladinian, the above interpretation should be revised. Also the Echinitosporites subzone still contains Ladinian elements. The age of this microflora is interpreted alternatively as Ladinian or Karnian.

The Triadispora verrucata subzone is unquestionably Carnian in age.

The microflora of the Aulisporites astigmosus zone correlates with the clearly coeval microflora over the epicontinental areas of Europe—in G.D.R. [27], Switzerland [9], and with the microflora of the Julian substage (middle Karnian)—Halobia rugosa zone (*Carnites floridus* in the Alps [8]).

The microflora equivalent to the Tuvalian substage (upper Karnian) is not found in Poland, probably because of the lack of microflora in the most part of the upper gypsum series of the Keuper.

The microflora of the Corollina meyeriana zone, especially of its upper part, distinguished within the Jarkowo and Zbąszynek Beds, correlates with the microflora of Steinmergel Keuper in G.D.R. [30], and of Postera-Schichten in F.R.G., and of "lower Rhaetic" *sensu germanico* in Denmark [18].

The microflora of the Ricciisporites tuberculatus zone, distinguished in the Wielichowo Beds contains index species of wide areal distribution. To the west of Poland these species characterize the "middle" and "upper Rhaetic" *sensu germanico* in G.D.R. [30], F.R.G. and Denmark [18], and in the upper part of the Westbury and Cotham Beds in England [22, 35]. To the east of Poland a similar microflora occurs in the Novorayskaya Formation in the Donetz Basin [13, 26].

With regard to the age of the microfloras of the Corollina meyeriana and Ricciisporites tuberculatus zones, the following conclusions can be drawn.

Miospores characteristic of the Corollina meyeriana zone are first ascertained in the Norian (Rhabdoceras suessi zone) of the Alps. They persist in the Rhaetian deposits (Choristoceras marshi zone) where miospores characteristic of the Ricciisporites tuberculatus zone gradually appear.

The similarity of the upper Norian and Rhaetian floras [21] and divergent opinions on the placement of the boundary between the two stages (proposal of extending the range of the Rhaetian after Wiedmann and others [36], and the contrary proposal by Tozer [34]—to extend the Norian by including the Rhaetian into it), render difficulties in determining the precise chronostratigraphic position of the uppermost Triassic in epicontinental areas. In this situation, the deposits described in Poland as the "Rhaetic" should be regarded as equivalent to the Norian and Rhaetian stages of the Alps.

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REFERENCES

[1] M. C. Adloff, J. Doubinger, Bull. Serv. Carte Geol. Als. Lorr., **22** (1969), 131–147.

[2] E. Antonescu, Mem. Inst. Geol., **13** (1970), 7—47.

[3] B. E. Balme, Palaeontology, **2** (1963), 12–40.

[4] B. E. Balme, Kansas Univ. Dept. Geol. Spec. Publ. No. 4 (1970), 306-453.

[5] B. E. Balme, Meddelelser om Grønland 200, **6** (1979), 1–37.

[6] M. I. Bogacheva, K. V. Vinogradova, *Proceedings of the III International Palynological Conference*, Nauka, 1973, pp. 19–22.

[7] J. H. Dolby, B. E. Balme, Rev. Palaeobot. Palynol., **22** (1976), 105—168.

[8] R. E. Dunay, M. J. Fisher, Pollen et Spores, **20** (1978), 177–187.

[9] J. Doubinger, D. Buhmann, Z. dt. geol. Ges., **132**, **1** (1981), 421–449.

[10] M. J. Fisher, AASP contributions series **58** (1979), 83–100.

[11] T. Freudenthal, Acta Botan. Nederl., **13** (1964), 203–236.

[12] N. Goubin, Rev. Inst. Française Petrole, **20** (1965), 1415–1461.

[13] E. A. Gluzbar, *Proceedings of the III International Palynological Conference*, Nauka, 1973, pp. 44–48.

[14] R. Helby, Spec. Publ. Geol. Sec. Aust., **4** (1973), 141–155.

[15] O. P. Yaroshenko, L. P. Golubeva, Izwiestia A. N. USSR, ser. geol., **10** (1981), 90–95.

[16] W. Klaus, Geol. Jb. Bundesanst., **5** (1960), 107–183.

[17] W. Klaus, Erdol. Z. Böhr- u. Fördertech., No. 4 (1964), 1–16.

[18] J. Lund, Geol. Survey of Denmark II, **109** (1977), 1–128.

[19] G. Leschik, Schweiz. Palaont. Abh. **72** (1955), 1–70.

[20] K. Madler, Geol. Jb. Beih., **65** (1964), 1–147.

[21] H. Mostler, B. W. Scheuring, M. Urlichs, *Österreichische Akademie der Wissenschaften Schriftenreiche der Erdwissenschaftlichen Kommissionen*, vol. 4. *Beitrage zur Biostratigraphie der Tethys-Trias*, 1978, pp. 141–174.

[22] S. J. Morebey, Palaeontographica Abt. 3., **152** (1975), 1-75.

[23] T. Orlowska-Zwolińska, Pr. Inst. Geol., **104** (1983), 1–89.

[24] T. Orłowska-Zwolińska, Acta Palaeont. Pol., **29**, No. 3–4 (1984), 161–194.

[25] P. Reinhardt, W. Schmitz, Freiberger Forschungshefte, C. 182, Palaontologie (1965), 19–36.

[26] E. V. Semenova, *Proceedings of the III International Palynological Conference*, Nauka, 1973, pp. 42–44.

[27] E. Schulz, Mber. Deutsch. Akad. Wiss., **6** (1964), 597–606.

[28] E. Schultz, Mitt. Zentr. Geol. Inst., No. 1 (1965), 257–287.

[29] E. Schulz, Geologie Bd Beih., **55** (1966), 130–151.

[30] E. Schulz, Paleont. Abh. Abt. B., **2**, No. 3. 1967, 427–633.

[31] E. G. Schmith, G. Warrington, *Procedings of the Yorkshire Geol. Society*, **38**. Part 2, No. 10 (1971), 201–227.

[32] J. Taugourdeau-Lantz, Rev. Palaeobot. Palynol., **17** (1974), 149–159.

[33] E. T. Tozer, Oster. Akad. d Wiss. Schr. Erdwiss. Komm., **4** (1978), 21–36.

[34] E. T. Tozer, Geol. Surv. Can Pap., (1979), 127–135.

[35] G. Warrington, Nature, **226** (1970), 254–256.

[36] J. Wiedmann, F. Fabricius, L. Krystyn, J. Reintner, M. Urlichs, Newsl. Stratigr., **8** (1978), 133–152.

[37] B. S. Venkatachala, D. Beju, R. K. Kar, The Palaeobotanist. **16** (1968), 29–37.

[38] H. Visscher, Acta Bot. Nederlandica, **15** (1966), 316–375.
[39] H. Visscher, Geol. Surv. Ireland. SP. Pap. No. 1 (1971), 1–114.
[40] H. Visscher, W. A. Brugman, Rev. Palaeobot. Palynol., **34** (1981), 115–128.

Т. Орловска-Зволиньска, **Палинологические зоны эпиконтинентального триаса Польши**

Микрофлора отличенная в эпиконтинентальном триасе Польши является базой для определения палинологических комплексовых зон и подзон. Отличены следующие зоны: Lundbladispora obsoleta-Protohaploxypinus pantii характеризует нижний пестрий песчаник. Микрофлора этой зоны проявляет отчетливое подобие к ассоциации Protonaploxypinus из грисбаха Гренландии [5] и на этой основе может быть признана как самая старая триасовая зона в Польше Densoisporites nejburgii отличена в среднем пестром песчанике. Система микрофлоры проявляет свойства микрофлоры оленека южнего Мангышлака [6]. Зона Voltziaceaesporites heteromorpha характеризует верхний пестрый песчаник, коррелирует с микрофлорой рэтского яруса в эпиконтинентальной бассейне Европы, а также верхнего верфенского яруса в Альпах. Обсуждается ее принадлежность к скифскому или анизейскому ярусу. Зона Perotrilites minor охватыва т мергелистые слои (верхний рэтский ярус или нижний раковинный известник), а так нижний раковенный известняк Tsugaepollenites oriens — средний раковенный известняк Микрофлора последних двух зон проявляет свойства типличные для анизийского яруса. Зона Heliosaccus dimorphus охватывает верхний раковинный известняк и нижний кей ер (без граничного доломита). Век этой микрофлоры можно определить как ладинс й ярус. Зона Porcelispora longdonensis определена для граничнего доломита и нижн гипсовых слоев. Микрофлора граничного доломита содержит еще элементы ладинско яруса, а ее хроностратиграфическая позиция остается еще дискусионной. Не возбуждае сомнения считать как карнийский ярус высшую часть этой зоны охватывающую высшую часть нижних слоев гипса. Зона Aulisporites astigmosus охватывает микрофлору тросникового песчаника и его возраст может быть определен как карник (юлий) в Альпах. Зона Corollina meyeriana установлена в самой высокой части верхних гипсовых слоев, а также в поочерёдно выделеных в дравненских, ярковских и збоншинецких слоях. Зона Ricciisporites tuberculatus отличено во велиховских слоях. Хроностратиграфическая позиция последних двух зон вусшего триаса Польши может быть определена как норийский-рэтийский ярус.