

Stratigrafija • Stratigraphy • Стратиграфия

The Early Famennian conodonts and fishes of Lithuania

Juozas Valiukevičius,
Nonna Ovnatanova

Valiukevičius J., Ovnatanova N. The Early Famennian conodonts and fishes of Lithuania. *Geologija*. Vilnius. 2005. No. 49. P. 21–28. ISSN 1392-110X

Four borehole cores of north central Lithuania have yielded more representative associations of conodonts and fishes of the Joniškis Formation than those known before (both Kupiai and Gruzdpiai Beds). The *Icriodus iowaensis* conodont zone is established here, dominated by the polygnathid-icriodid biofacies and correlated with the *crepida* Zone of the conodont standard. Among fishes, the phoebodontid and ctenacanthid? ichthyoliths of the *Phoebodus* cf. *rayi* association (the *crepida* conodont zone) are established, a new representative of phoebodonts and *Moythomasia* of palaeoniscoids being most stratigraphically valuable in the Joniškis Formation. The overlying Kuršiai Formation is ascribed to the *Polygnathus rhomboideus-Polylophodonta confluens* conodont association on the basis of the earlier published fauna and correlated with the standard *rhomboidea* Zone. Unfortunately, no organisms have been found to date in the earliest Famennian, Kruoja and Šiauliai formations.

Key words: early Famennian, Kruoja, Šiauliai, Joniškis and Kuršiai formations, conodonts, fishes, faunal associations

Received 4 November 2004, accepted 29 November 2004

Juozas Valiukevičius. Institute of Geology and Geography, T. Dėvėnkos 13, 03223 Vilnius, Lithuania. E-mail: valiukevicius@geo.lt

Nonna Ovnatanova. All-Russia Research Geological Petroleum Institute, Shosse Entuziastov 36, 105819 Moscow, Russia. E-mail: nonna.ovnatanova@ashot.de

INTRODUCTION

The Frasnian/Famennian boundary beds of Lithuania, the Pakruojis, Kruoja and Šiauliai formations until recently have been causing their age dating problems, attribution to the transgressive/regressive lithological complexes of the Late Devonian (Frasnian or Famennian?) and the presence or absence of a stratigraphic gap at this level. Dalinkevičius (1939) in his pioneering Kruoja paper and the spiriferid record attributed this formation to the Frasnian together with a thin overlying member of marls and dolomites which appeared clearly separated from the Joniškis limestones. Further researchers who focussed their interest on the Late Devonian of the Baltic (Жейба, 1960, 1964; Лиепиньш, 1964; Савваитова, 1977; Жейба, Савваитова, 1981) significantly changed the geological volume of the Kruoja and Šiauliai formations, but always dated them to the Famennian on the basis of brachiopods,

miospores and developmentary pattern by a correlation with Belarus and the central regions of the East European Platform. In the 1970s, when conodonts of some borehole cores were studied and several definitions by G. Freyer (Freiberg, Germany) in the lower Kruoja were made, Peiba came back to the dispute on dating and its possible late Frasnian age (Жейба, Валюкявичюс, 1972). The conodont-based correlation of the Kruoja and Šiauliai formations with the to Ið (the old *triangularis* Zone of Ziegler's 1962a zonation) has been proposed.

The Famennian age of this part of the profile is accepted in the last unified Devonian stratigraphical scheme of the Baltic (Григялис, 1978) after long discussions concerning both debatable versions. The early Famennian Substage is here shown to embrace the Kruoja, Šiauliai, Joniškis and Kuršiai formations. The application of conodont zones of the Ziegler's scheme was denied, and later (Valiukevičius, Peiba, Narbutas,



Fig. 1. Sketch map of the boreholes
1 pav. Grępinio išsidėstymo schema

1993) the local *Polygnathus politus* Zone in the Kruoja Formation was established on the basis of the old Freyer's definitions of conodonts.

This paper offers a discussion on the earlier known faunal taxa and the recent results on conodonts and associated fishes (representatives of different systematic groups, mostly not identified on the species level) of some new localities, and provides the biostratigraphical subdivision and correlation of the early Famennian in Lithuania with the other regions of the East European Platform. Four cores of boreholes situated in north central Lithuania (Fig. 1) were used in the study.

PREVIOUS WORK

The first record of Famennian conodonts of Lithuania (Жейба, Валюкявичюс, 1972) concerned the sparse finds of the dominant polygnathid-icriodid conodont biofacies characteristic of the shallow shelf and obtained from 11 borehole cores. Nevertheless, the geological series from the Kruoja to Pagarė formations was zoned on the grounds of the pelagic (palmatolepid) conodont facies (Ziegler, 1962a) without a necessary substantiation (it was the university diploma work of one of us, J.V.). These data need re-appraisal and a new biostratigraphical valorization, but the collection is unaccessible. The most applicable are conodonts of the Klaipėda-4 core according to G. Freyer. *Polygnathus politus* Ovnatanova, *Palmatolepis* sp. (as noted, characteristic of Ziegler's *triangularis* Zone) and *Ancyrodella* sp. were defined in the lower member of the Kruoja Formation. *Palmatolepis subperlobata* Branson et Mehl, which was found briefly ranged in the lowermost Joniškis Formation (lower Kupiai Beds) associated with *Pa. wolskae* Ovnatanova, *Polygnathus rhomboideus* Ulrich et Bassler, *P. procerus* Sannemann and *Icriodus cornutus* Sannemann, all sporadically extended through the entire Joniškis (to the top of the Gruzdių Beds), were attributed to the *crepida* Zone. These definitions were used later (Valiukevičius, Peiba, Narbutas, 1993), and the *Pa. subperlobata* and *Pa.*

wolskae local conodont zones, as correlatives of the *crepida* Zone, were shown in the Joniškis Formation. Similar conodont associations were recorded in a summarizing publication on the Devonian and Carboniferous of the Baltic (Жейба, Савваитова, 1981). *Palmatolepis triangularis* Sannemann was considered characteristic of the lowermost Kupiai, whereas *Pa. wolskae*, *Icriodus cornutus*, *Polygnathus procerus* and *P. ex gr. nodocostatus* Branson et Mehl, accompanied by other polygnathids and some ramiform elements, were reported to span the entire Joniškis Formation.

Kuzmin (Кузьмин, 1998) has published *Icriodus iowaensis* Youngquist et Peterson, *I. ex gr. alternatus* Branson et Mehl, *I. deformatus* Han, *Neopolygnathus vorontzovae* Kuzmin and *Palmatolepis triangularis* from the lower Joniškis Formation in Latvia. The occurrence of *Pa. triangularis* has based a correlation of the lower Kupiai Beds with the Middle?-Upper? *triangularis* CZ of the modern understanding.

The Kuršiai Formation in the Klaipėda-4 core of Lithuania was characterized by another conodont association (Freyer's data) including *Polygnathus perplexus* Thomas, *Polylophodonta confluens* (Ulrich et Bassler) and *Icriodus alternatus*. Later (Жейба, Савваитова, 1981), the following conodont association was recorded in the Kuršiai Formation: *Polygnathus nodocostatus*, *P. rhomboideus*, *P. glabra* Ulrich et Bassler and *Polylophodonta linguiformis* Branson et Mehl. The extremely shallow water character of the association and the rareness of the fauna was the reason for ascribing the local beds to *Polygnathus rhomboideus*-*Polylophodonta confluens* in the allied Kuršiai and Akmena formations (Valiukevičius, Peiba, Narbutas, 1993), tentatively correlated with the *rhomboidea* Zone of Ziegler's scale.

The early Famennian fish records in Lithuania are also very sparse. As listed in the overview of the Devonian and Carboniferous in the Baltic, rare finds of *Onychodus* sp. and dipterids are known in the Kruoja and Šiauliai formations; no vertebrates have been known to date in the Joniškis and more frequent specimens of *Devononchus*, *Onychodus*, *Holoptychius* and *Dipterus* were noted in the Kuršiai Formation. Valiukevičius (Valiukevičius, Kruchek, 2000) published acanthodians within this series. *Devononchus laevis* (Gross), *D. concinnus* (Gross), cf. *Cheiracanthus*, all taxa known only from scales, were considered to range the Frasnian and the entire Famennian, and the *Haplacanthus* sp. defined on fin spines was shown to be restricted to the early Famennian.

CURRENT RESULTS

The Lygumai-45 core has yielded the earliest in Lithuania *Polygnathus politus* in the dolomites of the upper Tatula Formation (middle Frasnian of the tripartite subdivision, Григялис, 1978) at a depth of 339 m. One more locality with this species that occurred earlier

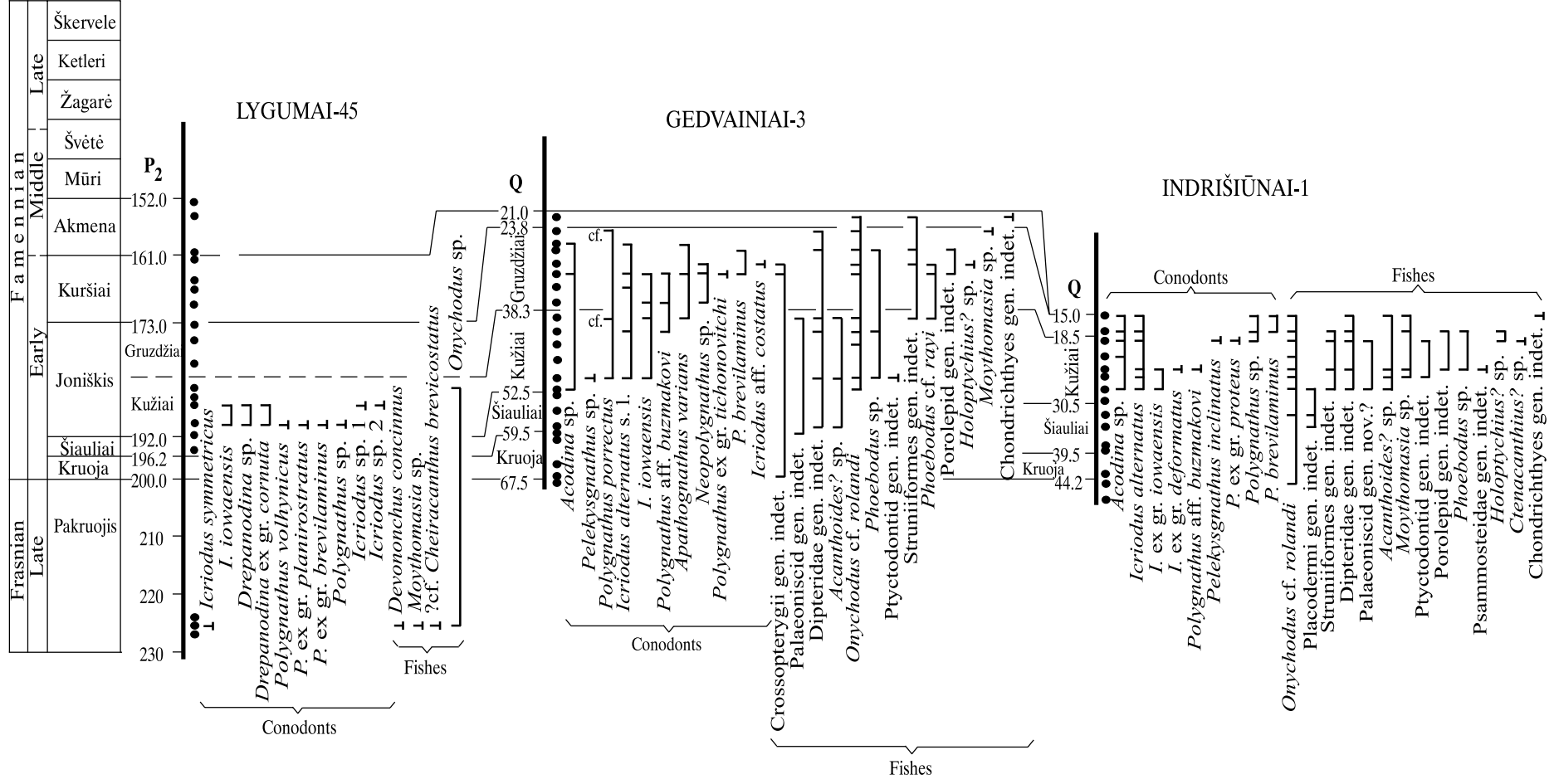


Fig. 2. Ranges of conodonts and fishes superimposed on the local stratigraphical units
 2 pav. Konodontø ir þuvø vertikalaus iðplitimo diapazonai vietiniuose stratigrafiniuose padaliniuose

than the Kruoja Formation as recorded in the scheme of 1993, is the Lepšiai-21267 core (see Fig. 1), depth 159.1m (the Stipiniai Formation, overlain by Pakruojis of the topmost Frasnian). *P. politus* is here associated with *P. subincompletus* Ovnatanova et Kononova, what undoubtedly proves the late Frasnian age of the rocks, the shallow water equivalents of the *gigas* Zone (Ovnatanova, Kononova, 2001) of the East European Platform.

The Kruoja Formation has yielded very rare ramiform conodont elements in the “sugar”-like fine-crystalline dolomites in Indriūnai-1 together with an crossopterygian teeth of *Onychodus* cf. *rolandi* (Gross) (Fig. 2). The latter persists also in the dolomitic marls of the Šiauliai Formation, where the unidentified fragments of placoderms co-occur. In Gedvainiai-3, the earliest to appear are crossopterygians (fragments of teeth) at the base of Kruoja Formation, and associated indistinct palaeoniscid, dipterid and *Acanthoides?* sp. (all represented by scales) in the uppermost Kruoja and the lowermost Šiauliai formations (58.1–60.2 m). No conodonts were found at this level.

Faunal associations are much more diversified in the overlying Joniškis Formation represented by different facies in the cores studied: dominant crinoid-ostracode nodular limestones with the marl interlayers in Lygumai and Gedvainiai and unevenly clayey dolomites in Indriūnai.

Conodonts of the lower Kupiai Beds (186.1–190.4 m) in the Lygumai-45 core, alongside the ramiform elements, are represented by *Icriodus iowaensis*, two more species (sp. 1 and sp. 2) of *Icriodus*, *Polygnathus volhynicus* Drygant, *P. ex gr. brevilaminus*, *P. ex gr. planirostratus* Dreesen et Duser, *Drepanodina* ex gr. *cornuta* Kononova and *Drepanodina* sp. Solitary *Onychodus* sp. teeth represent fishes in these beds (Fig. 2). In Gedvainiai, the *Icriodus iowaensis* conodont association is developed just over the base of the Kupiai Beds (50.1 m). This zonal species is here accompanied by *Icriodus alternatus*, *Icriodus* sp., *Pelekysgnathus* sp. and *Polygnathus porrectus* Vorontzova. The upper Kupiai Beds (39.5–42.0 m) have yielded the dominant ramiform elements including *Apathognathus varians* Branson et Mehl (an index of the extremely shallow water facies), also *I. iowaensis* and *Polygnathus porrectus* extended from the overlain rocks; *Polygnathus* aff. *buzmakovi* Kuzmin occurs for the first time and is more frequent in the overlying Gruzdžiai Beds (the lower part). Conodonts of the Indriūnai core in the Kupiai Beds are similar. Ramiform and coniform elements prevail, associated with the fewer numbers of *Icriodus iowaensis*, *I. alternatus* and *I. ex gr. deformatus* Han (the latter is not defined in other localities). *Polygnathus* aff. *buzmakovi* enters the sequence in the mid-Kupiai Beds. The uppermost Kupiai Beds (depth 19.7 m) lack *Icriodus iowaensis*, but yield *Pelekysgnathus inclinatus* Thomas and *Pe. ex gr. proteus* Aristov.

The fish association of the Kupiai Beds includes *Onychodus* cf. *rolandi*, a ptyctodontid, *Acanthoides?* sp., *Phoebodus* sp., palaeoniscid and dipterid, composing the principal part of the association in both the Gedvainiai and the Indriūnai cores. The most stratigraphically valuable teeth of a chondrichthyan shark, *Phoebodus* cf. *rayi* Ginter et Turner (Gedvainiai, depth 39.5 m) and scales of *Ctenacanthus?* sp. (Indriūnai, depth 19.7 m) appear in the topmost Kupiai Beds. The latter core yielded also a palaeoniscid gen. nov.? (lineage of the *Moythomasia*-type), which may aid future biozonal purposes.

The conodont association of the Gruzdžiai Beds is most representative in the Gedvainiai core. Ramiform elements and *Icriodus alternatus* are ranging the entire volume and persisting in the overlying Kuršiai Formation. The richest association is found in the middle part (33.05–30.75 m) where, together with *Icriodus iowaensis* and *Polygnathus* aff. *buzmakovi* found for the last time in the series, *P. brevilaminus*, *P. ex gr. tichonovitchi* Kuzmin, *Neopolygnathus* sp. and *Icriodus* aff. *costatus* co-occur. The upper Gruzdžiai Beds are characterized only by *Apathognathus varians*, *Icriodus alternatus*, *Polygnathus porrectus* and *P. brevilaminus*.

Many fish taxa in the Gruzdžiai Beds are inherited from the overlain rocks, for example, chondrichthyan *Phoebodus* cf. *rayi*, a potential zonal fossil. The new elements worth mentioning are palaeoniscid *Moythomasia* sp. in the uppermost Gruzdžiai Beds of the Gedvainiai core (25.0 m), which appeared earlier in Indriūnai (26.8 m), and another unidentified chondrichthyan shark (represented by scales). The latter is spanning also the Kuršiai Formation composing here an impoverished association containing *Onychodus* cf. *rolandi* teeth and one more struniiform crossopterygian.

DISCUSSION

The current results provide no data for the conodont-based dating of the Frasnian/Famennian boundary formations, Pakruojis, Kruoja and Šiauliai. A single *Icriodus symmetricus* of the Pakruojis Formation in the Lygumai-45 core has a wide range in the Frasnian, from the *asymmetricus* to the Uppermost *gigas* CZ, and is recorded from many regions of the East European Platform and of the world.

The earlier published conodonts (Жейба, Валукевичюс, 1972) of the lower Kruoja Formation, *Ancyrodella* sp., *Polygnathus politus* and *Palmatolepis* sp., perhaps mark the transitional Frasnian / Famennian character of the fauna, but these finds are insufficient for the re-appraisal and accurate dating of the controversial age. The fact elucidated in the current work is that *P. politus* cannot represent the lowermost Famennian local zone of conodonts as is first found in the mid-Frasnian in Lithuania.

The standardized stratigraphic position of the *triangularis* CZ was uncertain for some time everywhere.

Although it had been ascribed to the Frasnian *Manticoceras* Stage (Ziegler, 1962a, 1971), the Middle and Upper *triangularis* (post-do 1) were noted as characteristic of the shortened *Manticoceras*, excluding the uppermost, *Crickites holzapfeli* Zone. Ziegler (1962b) expressed doubts as to the age of the Middle *triangularis*, and the base of the Upper *triangularis* CZ was treated by him the Frasnian/Famennian boundary. Later, this boundary was placed at the base of the Middle *triangularis* (Ziegler, Klapper, 1985). Since the decision of the 2nd symposium on the stratigraphy of Devonian System in Calgary, 1987, the F/F boundary has been lowered to the base of the *triangularis* CZ.

The problem of dating the F/F boundary beds has been debatable until recently. The large fluctuations of the World ocean level, the Uppermost *gigas*-Zone eustatic fall and the Mid-*triangularis* eustatic rise, as well as one of the giant extinctions of the organisms fall into this time (McLaren, 1982; McLaren, Goodfellow, 1990).

The stratigraphic gap at the boundary of the *triangularis* and *crepida* CZ is often traced on the East European Platform. The problem has arisen with a new impulse after the palynologically-based Volgograd Regional Stage at the base of the Famennian in the Volgograd area of the Volga–Urals region was erected, which is at present considered to be Lower and Middle *triangularis* (Галушин, Кононова, 2004; Манцурова, 1987; Манцурова, Цыганкова, 1995).

Conodonts, even sparse, can indicate a stratigraphic gap at the F/F boundary in Lithuania. There is a possible lack of correlatives of the *Palmatolepis triangularis* CZ, or at least of the Lower and Middle *triangularis*.

Unfortunately, the recent conodont study provides no data for solving the age problem of the Kruoja and Šiauliai formations, which were tentatively attributed to the Famennian and had been debatable since the Freyer's conodont determinations in the 1970s. Evaluating the stratigraphic range of these taxa, we may summarize that conodonts of the genus *Ancyrodella* are widespread in the Frasnian and do not extend into the Famennian. *Polygnathus politus* has been originally described from the upper Frasnian of the Central Devonian Field and was further obtained in the correlatives of the shallow water facies in the Volga–Urals and Timan–Pechora regions of the East European Platform, as well as in Belgium, Poland, Canada, Alaska, etc. (Ovnatanova, Kononova, 2001). Sparse occurrences of this species are also known in the upper Frasnian of the deep water depression sections on the easternmost part of the East European Platform (Ziegler, Ovnatanova, Kononova, 2000). The *Palmatolepis* sp. defines only the Late Devonian (Frasnian–Famennian) age of the rocks.

Thus, the earlier established conodonts of the Kruoja formation might be assessed as follows: 1) if we accept presence of *Palmatolepis* sp. characteristic of the *triangularis* CZ in this association (as established by

Freyer), the two other distinctly Frasnian species, *Polygnathus politus* and *Ancyrodella* sp., should be treated as re-deposited. The lower Kruoja beds might be of the Famennian *triangularis* Zone age; 2) if we analyse the association of *Palmatolepis* sp., *Ancyrodella* sp. and *Polygnathus politus*, its dating is certainly Frasnian, the *gigas* CZ.

The *Icriodus iowaensis* CZ, a shallow water equivalent of the *crepida* Zone, which is defined in the Joniškis Fm. (both Kupiai and Gruzdžiai Beds) with a longer species list for the first time, is ascribed to the polygnathid-icriodid biofacies and includes *Icriodus iowaensis*, *I. alternatus*, *I. aff. costatus*, *I. ex gr. deformatus*, *Polygnathus brevilaminus*, *P. ex gr. tichonovitchi*, *P. volhynicus*, *P. porrectus*, *P. ex gr. planirostratus*, *P. aff. buzmakovi*, *Pelekysgnathus inclinatus*, *Pe. ex gr. proteus* and *Neopolygnathus* sp. associated with the ramiform and coniform elements which prevail in the samples. However, the most normal and deepest marine sediments of the Joniškis Fm. are distributed in the western part of Lithuania, thus the occurrence here of the only Famennian palmatolepids (Жейба, Савваитова, 1981), *Pa. subperlobata*, *Pa. triangularis* and *Pa. wolskae* in the Klaipeđa-4 core is accepted.

The Joniškis Formation is correlated with the Zadonsk Stage of the central regions of Russian Plate, where a more representative association of icriodids and polygnathids is recorded. *Palmatolepis wolskae*, *Pa. subperlobata* and *Pa. circularis* make the first occurrences in the upper Zadonsk (Аристов, 1988; Родионова и др., 1995) which is dated by the *crepida* or also by the possible Upper *triangularis* CZ.

In Belarus, Pripyat trough, the early Famennian has been recently subdivided into five faunal units distinguished mainly by pelagic palmatolepids. The beds with *I. iowaensis* (Kruchek, Strelchenko, 1998; Strelchenko, Kruchek, 1999; Кручек и др., 2001) are defined in the lower Zadonsk R. S. (Kuzmichi and lower Igraev Beds) and attributed to the Middle and Upper *triangularis*. The upper Zadonsk (upper Igraev and Visha formations) is ascribed to the beds with *Palmatolepis wolskae*-*Pa. circularis* (the *crepida* CZ). In our opinion, the lower Kuzmichi Beds together with the Domanovichi Formation might correlate with the Volgograd Stage.

Conodonts of the Elets Stage from the central East European Platform are correlated with the *rhomboida* CZ (Родионова и др., 1985). Their analogues in Belarus are defined as beds with *Palmatolepis klapperi*-*Polygnathus semicostatus* (the Turov and Drozdy formations) and beds with *Palmatolepis subperlobata* (the Petrikov Formation).

The north central Lithuanian conodonts of the extremely shallow water facies of the impoverished *Icriodus iowaensis* Zone are slightly similar to those of the Zadonsk Stage in Belarus. Like in Lithuania, some concurrent interval between the *triangularis* Zone conodonts and these of the *Icriodus iowaensis* is also

obvious here. Tracing of the *crepida* CZ at the boundary of the Igraev Fm. approximates this horizon close to the base of the Joniškis Formation with the entering *Icriodus iowaensis* in Lithuania.

Extension of the *I. iowaensis* CZ into the younger sediments is slightly dubitative in Lithuania. No conodonts to date have been found in the Kuršiai Formation in this study. The previously referred *Polygnathus perplexus*, *P. rhomboideus*, *P. brevilaminus*, *P. glabra*, *Polylophodonta confluens* and *Po. linguiformis* might form a next, *Polygnathus rhomboideus*-*Polylophodonta confluens* association and provide a correlation with the standardized *rhomboidea* CZ.

The fish microremains recorded in this study contribute only little to the exact age dating of rocks. A single chondrichthyan *Phoebodus* cf. *rayi* defined in the middle of the Joniškis Formation permits an attribution to the Lower-Middle *crepida* CZ on analogy with the Parry Islands Formation in Arctic Canada and the Ryauzyak River series of the South Urals (Ginter, Turner, 1999). Other fishes are poorly studied yet, not or rarely identified on the species level, but some taxa, for example, another Chondrichthyes gen. indet. and *Ctenacanthus?* sp., as well as some palaeoniscids (of the *Moythomasia*-type) might serve as the potential zonal fossils in the case of collectioning more material from the wider geological series.

CONCLUSIONS

1. The most representative conodont and fish characteristics of the Joniškis Formation have been obtained for the first time. The *Icriodus iowaensis* conodont zone is defined ranging the entire volume of the Kupjiai and Gruzdpjiai Beds which are correlated with the Zadosk Stage of the Russian Plate, including the Igraev, Visha and possibly the upper part of the Kuzmichi Beds in Belarus.

2. The extremely shallow water facies of the lower Famennian in Lithuania have yielded the polygnathid-icriodid conodont associations dominated by the ramiform and coniform elements, and cannot be correlated with the earlier (Ziegler, 1962a, 1971) or the last standard (Ziegler, Sandberg, 1990) conodont scales.

3. More of conodont material is still in need to elaborate the Baltic conodont scale suitable for the rock facies characteristic of the region.

4. There is the problem of a correlation of the shallow water stratigraphic scales with those of the pelagic facies (Ziegler, Sandberg, 1990). Questions arise when rare palmatolepids of the Lithuanian-like rock facies are applied to correlate these different scales. The occurrence points of the most stratigraphically valuable taxa perhaps mark the maximum of transgressions and immigration levels of fauna from the deeper basins, but not the first occurrence horizons of taxa. A further detailed study of the stratigraphic ranges of polygnathids and icriodids in the pelagic facies will

aid a stricter control of conodont zonal units in both stratigraphic scales.

5. The fish determinations obtained from microremains have increased the list of taxa defined in the Joniškis Formation. Among the long-ranging taxa, those having a zonal stratigraphic potential are worth mentioning. Of them, *Phoebodus* cf. *rayi*, *Ctenacanthus?* sp. and another yet unidentified representative of chondrichthyans associated with the two palaeoniscids of the *Moythomasia*-type are the most significant species of the *Phoebodus rayi* local ichthyolith zone correlated with the Lower to Middle *crepida* according to the conodont standard.

ACKNOWLEDGEMENTS

Authors are indebted to Jaunutis Bitinas from Lithuanian Geological Survey for the sampling of cores and providing lithological and stratigraphical information. Dr Lidija Paškevičienė (Institute of Geology and Geophysics, Vilnius) is thanked for reviewing the manuscript and helpful improvements.

This study is a contribution to IGCP 491 Project "Middle Palaeozoic Vertebrate Biogeography, Palaeogeography, and Climate".

References

- Dalinkevičius J. 1939. New species of *Spirifer* ex gr. *anossofi* from the Devonian of Lithuania (Kruoja beds). *Vytauto Didžiojo Universiteto Matematikos-gamtos fakulteto darbai*. **13**. Kaunas. 3–9.
- Ginter M., Turner S. 1999. The early Famennian recovery of phoebodont sharks. *Acta Geologica Polonica*. **49**(2). 105–117.
- Kruchek S. A., Strelchenko T. V. 1998. Conodonts in Early Famennian (Devonian) ecosystems of the Pripyat Trough (Belarus). Bagnoli G. (ed.). *Seventh International Conodont Symposium held in Europe*. Abstracts. Bologna–Modena. 58–59.
- McLaren D. J. 1982. Frasnian–Famennian extinctions. *Geological Society of America. Special Paper*. **190**. 477–484.
- McLaren D. J., Goodfellow W. D. 1990. Geological and biological consequences of giant impact. *Annual Review of Earth Planetary Science*. **18**. 123–171.
- Ovnatanova N. S., Kononova L. I. 2001. Conodonts and Upper Devonian (Frasnian) Biostratigraphy of central regions of Russian Platform. *Courier Forschungsinstitut Senckenberg*. **121**. 1–115.
- Strelchenko T. V., Kruchek S. A. 1999. Conodont-bearing beds in deposits of the Famennian Stage of the Pripyat Trough (Belarus). Lukševičs E., Stinkulis G. & Kalnina L. (eds). *The Fourth Baltic Stratigraphical Conference. Problems and Methods of Modern Regional Stratigraphy*. Abstracts. Riga. 105–107.
- Valiukevičius J., Kruchek S. 2000. Acanthodian biostratigraphy and interregional correlations of the Devonian of the Baltic States, Belarus, Ukraine and Russia. Blicek A. & Turner S. (eds). *Palaeozoic Vertebrate Biochronology and Global Marine/Non-Marine Correlation. Final Report of IGCP*

- 328 (1991–1996). *Courier Forschungsinstitut Senckenberg*. **223**. 271–289.
- Valiukevičius J., Peiba S., Narbutas V. 1993. Devonian (with a stratigraphical scheme). Paškevičius J. (ed.). *Catalogue of the Vendian–Devonian stratotypes of Lithuania*. Vilnius, Geological Society of Lithuania. 86–104.
- Ziegler W. 1962a. Taxonomie und Phylogenie Oberdevonischer Conodonten und ihre stratigraphische Bedeutung. *Abhandlungen des Hessischen Landesamtes für Bodenforschung*. **38**. 1–166.
- Ziegler W. 1962b. Phylogenetische Entwicklung stratigraphisch wichtiger Conodonten-Gattungen in der *Manticoceras*-Stufe (Oberdevon, Deutschland). *Neues Jahrbuch für Geologie und Paläontologie. Abhandlungen*. **114**(2). 142–168.
- Ziegler W. 1971. Conodont Stratigraphy of the European Devonian. *Geological Society of America. Memoire* **127**. 227–284.
- Ziegler W., Klapper G. 1985. Stages of the Devonian Systems. *Episodes*. **8**(2). 104–109.
- Ziegler W., Ovnatanova N. S., Kononova L. I. 2000. Devonian Polygnathids from the Frasnian of the Rhenisches Schiefergebirge, Germany, and the Russian Platform. *Senckenbergiana Lethaea*. **80**(2). 593–645.
- Ziegler W., Sandberg C. A. 1990. The Late Devonian standard conodont zonation. *Courier Forschungsinstitut Senckenberg*. **121**. 5–115.
- Аристов В. А. 1988. Девонские конодонты Центрального девонского поля Русской платформы. Москва: Наука. 120 с.
- Галушин Г. А., Кононова Л. И. 2004. Биостратиграфия верхнефранских и нижнефаменских отложений Волгоградского Поволжья по конодонтам. *Бюллетень Московского общества испытателей природы. Отдел геологический*. **79**(1). 33–47.
- Григялис А. А. (ред.) 1978. Решения Межведомственного регионального стратиграфического совещания по разработке унифицированных стратиграфических схем Прибалтики 1976 г (с унифицированными стратиграфическими корреляционными таблицами). Ленинград. 1–86.
- Жейба С. 1960. Стратиграфия и фауна фаменских отложений Литвы. Автореф. дисс. доктора геол.-мин. наук. Вильнюс. 19 с.
- Жейба С. 1964. Некоторые литолого-фациальные и палеогеографические данные фаменских отложений западной части Русской платформы. *Научные труды вузов Литвы. География и геология*. **3**. 179–185.
- Жейба С., Валюквичюс Ю. 1972. Новые данные о фаменских конодонтах Южной Прибалтики. *Lietuvos aukštųjų mokyklų mokslo darbai. Geografija ir geologija*. **9**. 167–171.
- Жейба С., Савваитова Л. С. 1981. Фаменский ярус. Сорокин В. С. (ред.). *Девон и карбон Прибалтики*. Рига: Зинатне. 301–333.
- Кононова Л. И., Овнатанова Н. С. 1995. Конодонты. Ржонсницкая М. А. (ред.). *Девон Воронежской антеклизы и Московской синеклизы*. Москва. 136–158.
- Кручек С. А., Махнач А. С., Голубцов В. К., Обуховская Т. Г. 2001. Девонская система. Махнач А. С., Гарецкий Р. Г. и Матвеев А. В. (ред.). *Геология Беларуси*. Минск. 186–239.
- Кузьмин А. В. 1998. Происхождение рода *Neopolygnathus* Vorontzova (Conodonta). *Палеонтологический журнал*. **8**. 36–39.
- Лиепиньш П. П. 1964. Об унифицированной субрегиональной схеме стратиграфии девонских отложений. *Известия Академии Наук Латвии*. **1**. 21–26.
- Манцурова В. Н. 1987. Палинологическая характеристика линевских и уметовских слоев Волгоградского Поволжья. *Нефтегеологическая зональность и методы поисков нефти и газа в Прикаспийском регионе*. Москва. 95–101.
- Манцурова В. Н., Цыганкова В. А. 1995. Характеристика волгоградского горизонта нижнефаменского подъяруса (палинозона *Corbulispora vimineus–Geminispora vasjatica*) Волгоградского Поволжья. *Палинология в России*. **1**. Москва. 34–42.
- Родионова Г. Д., Умнова В. Т., Кононова Л. И., Овнатанова Н. С., Ржонсницкая М. А., Федорова Т. И. 1995. Девон Воронежской антеклизы и Московской синеклизы. Москва. 265 с.
- Савваитова Л. С. 1977. Фамен Прибалтики. Рига: Зинатне. 128 с.

Juozas Valiukevičius, Nonna Ovnatanova

LIETUVOS ANKSTYVOJO FAMENIO KONODONTAI IR PUVYS

Santrauka

Ankstyvojo famenio konodontai ir puvyis ištirti keturiuose diaurės vidurio Lietuvos grafiniuose: Lepdiū-21267, Lygumø-45, Gedvainiø-3 ir Indriðiũnø-1. Deja, bandiniai iš ankstyviausio famenio svitø, Kruojos ir Ðiauliø, yra neinformatyvūs: rasti tik pavieniai stratigrafiðkai nereikðmingi konodontø ramiforminiai elementai bei itin plaèiø stratigrafiniø diapazonø þuvø mikroliekanos (paleoniskos, akantodø, riedapelekiø ir dvikvapiø). Daug gausnès organizmø bendrijos iðryðkintos Joniðkio svitoje ir yra bendros tiek Kuþiø, tiek Gruzdiø sluoksniams. Biostratigrafiðkai apibrëþta *Icriodus iowaensis* konodontø zoninë bendrija (standartinès *crepida* zonos koreliatyvas), atstovaujama ikriodidø ir polygnatidø, yra itin būdinga sekliavandenėms facijoms. Bendrijai aprastos rūðys: *Icriodus iowaensis*, *I. alternatus*, *I. aff. costatus*, *I. ex gr. deformatus*, *Polygnathus volhynicus*, *P. brevilaminus*, *P. aff. buzmakovi*, *P. ex gr. tichonovitchi*, *P. porrectus*, *Pelekysgnathus inclinatus*, *Pe. ex gr. proteus*, *Neopolygnathus* sp. Iš þuvø svarbiausi yra Chondrichthyes atstovai: *Phoebodus* cf. *rayi* (asocijuojasi su *crepida* zonos konodontais), *Ctenacanthus*(?) sp., kitas fybodontø atstovas (nauja rūðis?) bei naujos genties(?) paleoniskai ir *Moythomasia* filogenetinė linijos nauja rūðis. Konodontø radiniai leidþia Joniðkio svitã koreliuoti su Zadonsko horizontu Centriniam devoniniame lauke bei Pripetės ádauboje Baltarusijoje.

Aukðèiau slûgsanèioje Kurðiø svitoje vëlgi rasti tik ramiforminiai konodontø elementai bei Chondrichthyes ir riedapelekiø þuvø dantukai. Ankstesnėje literatūroje þinomø konodontø pagrindu (*Polygnathus perplexus*, *P. rhomboideus*, *P. brevilaminus*, *P. glabra*, *Polylophodonta confluens*, *Po. linguiformis*) išskirta *Polygnathus rhomboideus–Polylophodonta confluens* bendrija koreliuojama su standartinė *rhomboidea* konodontø zona.

Юозас Валоукявичюс, Нонна Овнатанова

РАННЕФАМЕНСКИЕ КОНОДОНТЫ И РЫБЫ ЛИТВЫ

Резюме

Раннефаменские конодонты и рыбы исследованы в четырёх скважинах Северо-Центральной Литвы: Ляпшай-21267, Лигумай-45, Гядвайняй-3 и Индришюнай-1. К сожалению, пробы из двух самых ранних фаменских свит, круояской и шяуляйской, оказались неинформативными: обнаружены только рамиформные элементы стратиграфически незначительных конодонтов и микроостатки рыб, имеющие широкие стратиграфические диапазоны (палеонисков, акантодов, кистепёрых и двоякодышащих). Намного более представительные ассоциации организмов выявлены в йонишкской свите (в кужайских и грузджайских слоях). Хорошо обособленная биостратиграфически зональная ассоциация конодонтов зоны *Icriodus iowaensis* (коррелятив стандартной *crepida*) с доминирующими икриодидами и полигнатидами характерна для чрезвычайно мелководных фаций. Для ассоциации

характерны следующие виды: *Icriodus iowaensis*, *I. alternatus*, *I. aff. costatus*, *I. ex gr. deformatus*, *Polygnathus volhynicus*, *P. brevilaminus*, *P. aff. buzmakovi*, *P. ex gr. tichonovitchi*, *P. porrectus*, *Pelekysgnathus inclinatus*, *Pe. ex gr. proteus*, *Neopolygnathus* sp. Важнейшими представителями среди рыб являются *Phoebodus* cf. *rayi* (указывающий на возраст отложений зоны *crepida*), *Ctenacanthus?* sp., другой, возможно новый, вид фибодонтов, а также новый род? палеонисков и новый вид филогенетической линии *Moythomasia*. Йонишкская свита по конодонтам коррелирует с задонским горизонтом Центрального девонского поля и Припятской впадины Беларуси.

В перекрывающей курсаской свите обнаружены лишь рамиформные элементы конодонтов, а также зубчики *Chondrichthyes* и кистепёрых рыб. Здесь только по конодонтам из литературных источников (*Polygnathus perplexus*, *P. rhomboideus*, *P. brevilaminus*, *P. glabra*, *Polylophodonta confluens*, *Po. linguiformis*) выделяется ассоциация *Polygnathus rhomboideus*-*Polylophodonta confluens*, коррелируемая со стандартной зоной *rhomboidea*.