

УДК 551.733.1

J. NÕLVAK, T. MEIDLA, Linda HINTS

THE TAUČIONYS FORMATION (*HOLORHYNCHUS* BEDS) IN THE ILJINSKOJE BORING (PSKOV DISTRICT)

In the South East Baltic the Taučionys Formation, first mentioned as beds with *Holorhynchus* (Пашкевичюс, 1963, 1968; Мянниль, 1966) has been considered to belong to the lowermost part of the Porkuni Regional Stage (Брангулис et al., 1982; Ульст et al., 1982; Решения . . . , 1987) or to the upper part of the Pirgu Regional Stage (Kaljo et al., 1988). So far there have been few special studies on fossils in the *Holorhynchus* beds in the East Baltic. Some brachiopods, corals and echinoderm columnals have been mentioned, mostly in the stratigraphic works.

We report new data on the Upper Ordovician macro- and microfossils in the Iljinskoje boring enabling to specify the stratigraphic position of the Taučionys Formation.

The Iljinskoje borehole, about 90 km south of Pskov, is the north-easternmost section of the Taučionys Formation in the Lithuanian con-facies belt of the Baltic basin. The core of the Iljinskoje section has been described by L. Põlma, who divided the Ordovician strata into four parts (beds):

1) 492.0—503.0 m (F_{1c}) — light grey medium-bedded argillaceous and organodetritic limestones with dark grey layers of calcareous and argilla-ceous marls;

2) 479.1—492.0 m (F_{1cTč}) — light grey, slightly brownish, thin- or medium-bedded, partly seminodular cryptocrystalline organodetritic lime-stones with thin (2—5 cm), rarely thicker (about 10 cm) layers of dark-brown calcareous and argillaceous marls. Limestone-marl contacts sharp. The lower boundary quite distinct;

3) 474.0—479.1 m (?F_{1c}) — light grey, slightly brownish seminodular organodetritic limestones. Lower boundary transitional;

4) 469.8—474.0 m (?F₁₁) — light grey, partly yellowish seminodular dolomites (above a depth of 471.4 m) and organodetritic limestones. Discontinuity surfaces on the boundaries of different lithotypes.

The distribution of macrofossils in the Taučionys Formation (the 2nd bed) and in the overlying strata will be discussed in some general aspects.

In the lower half of the Taučionys Formation (int. ~485—492.0 m) macrofossils are rare. Besides *Holorhynchus* sp. there are fragments of strophomenids, halysitid *Catenipora tapaensis* Sok. and alga *Vermiporella*. *Ptychopleurella* sp., *Parastrophina?* sp. and *Asteropeltis* sp. (det. by Reet Männil) occur at the lower boundary (Fig. 1). In Norway the last two genera are represented in the *Onniella* association of the Stage 5a (Brenchley, Cocks, 1982).

The fossiliferous upper half of the formation (int. 379.1~485 m) is characterized first of all by *Holorhynchus* and *Vermiporella*. The corals become more frequent. *Holorhynchus* is represented by disarticulated valves and their fragments which are well noticeable on the surface of the

core. Almost complete shell of *Holorhynchus giganteus* Kiær has been found at a depth of 480.0 m. *Holorhynchus* is associated with rare strophomenids, dalmanellids (*Isorthis?* sp.), sowerbyellids (*Thaerodonta?* sp.) and atrypids (*Eospirigerina* sp., in the topmost part of the Taučionys Formation).

The low diversity of the macrofossils makes these *Holorhynchus* beds similar to the analogous beds in Norway (Brenchley, Cocks, 1982), but different from the strata with *Holorhynchus* in Sweden (Jaanusson, 1982).

The topmost 9.3 m of the Upper Ordovician section (the 3rd and 4th beds) are characterized by halysitids (*Catenipora tapaensis*, *C.* cf. *tapaensis*), rugose corals and echinoderm columnals (mostly in bed 4). The circular columnals with quadrangular lumen (depth 474 m) are quite similar to columnals in the Rõa Member of the Porkuni Regional Stage

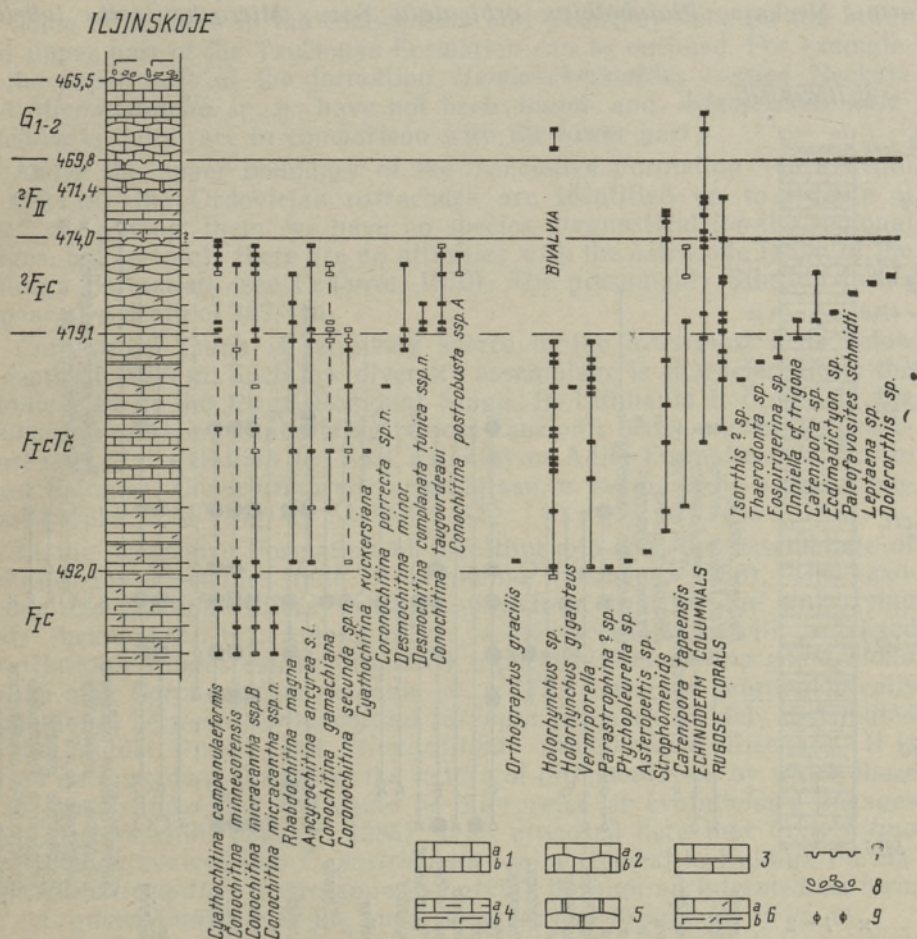


Fig. 1. Distribution of chitinozoans and macrofossils in the Upper Ordovician and Lower Silurian strata of the Iljinskoje core. An empty quadrangle indicates that the identification is conditional (cf.). The core section after L. Põlma. Legend: 1a — limestone, 1b — cryptocrystalline (aphanitic) limestone, 2a — seminodular limestone, 2b — seminodular cryptocrystalline limestone, 3 — limestone with thin (mostly less than 5 cm) layers of calcareous and argillaceous marls, 4a — argillaceous limestone, 4b — calcitic marls, 5 — seminodular dolomite, 6a — fine organodetritic limestone; 6b — organodetritic marls; 7 — discontinuity surface, 8 — denudation surface with conglomerate, 9 — silicification. F_{II} — Porkuni Regional Stage; F_{IC} — Pirgu Regional Stage; T_Ě — Taučionys Formation; G₁₋₂ — Juuru Regional Stage (Silurian).

in North Estonia. At the same time *Catenipora tapaensis* has not been found in the strata younger than the Pirgu age. The brachiopods in this part of the section are quite rare. There occurs *Onniella* cf. *trigona* Rubel (Хинтс, 1975) which has a great similarity with the *O. kalvoja* Cocks from some brachiopod associations of Stages 5a and 5b in Norway (Cocks, 1982; Brenchley, Cocks, 1982).

In the Iljinskoje core the Taučionys Formation and the underlying strata (bed 1) contain rich and diverse ostracode fauna (Fig. 2) consisting of more than 50 species. Some species (*Adamczakia holosolenica* Scallreuter, *Easchmidtella* sp. n.) indicate to the faunal connection with the Estonian confacies belt.

The strata below the Taučionys Formation contain an ostracode association represented by two kinds of species: a) ostracodes widely distributed in the Upper Ordovician [*Steusloffina cuneata* (Steusloff), *Medianella blidenensis* (Gailite), *M. intecta* (Stumbur), *Rectella romboformis* Neckaja, *Platybolbina orbiculata* Sarv, *Microcheilinella lubrica*

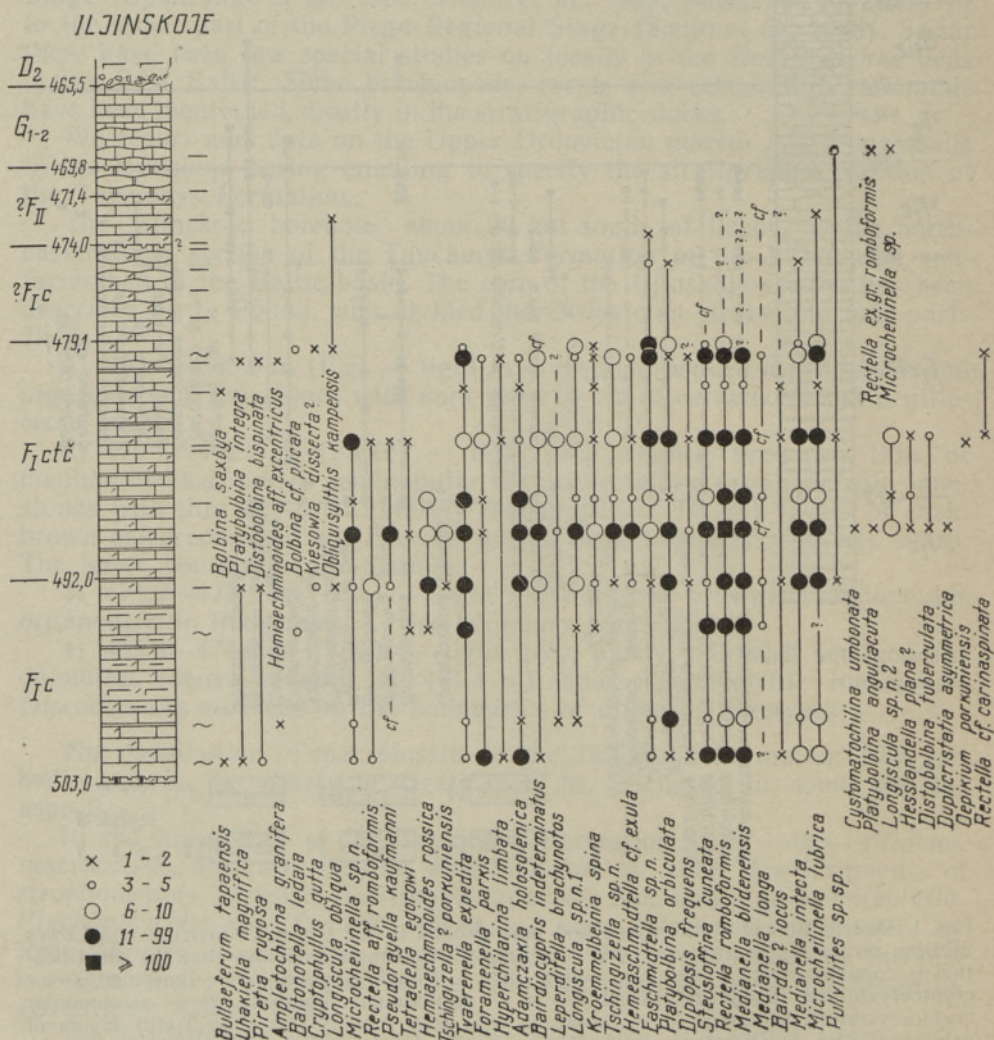


Fig. 2. Distribution of ostracodes in the Upper Ordovician and Lower Silurian strata of the Iljinskoje core.

(Stumbur), *Bairdiocypris indeterminatus* Pranskevicius] and b) a number of species appearing in the Pirgu Regional Stage [*Foramenella parkis* (Neckaja), *Piretia rugosa* (Steusloff), *Adamczakia holosolenica*, *Easchmidtella* sp. n.]. Two species *Baltonotella ledaia* Sidaravičienė and *Adamczakia holosolenica* established in this part of the section have not been known from the Porkuni Regional Stage in the North East Baltic.

The composition of the ostracode fauna in the Taučionys Formation (bed 2) is quite similar to that in the underlying strata (bed 1) undoubtedly of the Pirgu age. Only *Duplicristatia asymmetrica* Scallreuter and *Oepikium porkuniensis* Henningsmoen, represented by a few specimens, are previously known from the rocks of the Porkuni age in North Estonia. At the same time *D. asymmetrica* is established in the Kuldiga Formation of the Porkuni Regional Stage (Сарв, Мейдла, 1984) and *O. porkuniensis* from the Stages 5a and 5b in Norway (Henningsmoen, 1954).

Some differences in the composition and frequency between the lower and upper part of the Taučionys Formation can be outlined. For example, in the upper part of the formation *Hemiaechminoides rossica* Neckaja and *Microheilinella* sp. n. have not been found and *Adamczakia holosolenica* is quite rare in comparison with the lower part..

Above the upper boundary of the Taučionys Formation (at a depth of 479.1 m) the Ordovician ostracodes are identified up to a depth of 472.7 m. Among them we have no species diagnostic for the regional stages, but certainly there are no affinities with the ostracode fauna of the Kuldiga Formation (see Гайлите, 1970). The presumably Silurian forms appear at a depth of 469.3 m.

Chitinozoan fauna is relatively scarce in the lowermost beds below a depth of 492.0 m. Such low diversity assemblage is characteristic to the middle part of the Pirgu Regional Stage. In Lithuania it occurs in the Ukmerge Formation (underlying typical Taučionys beds) and in the lowermost part of the Halliku (in East Estonia) or Adila Formation (in North-West Estonia). *Conochitina micracantha* ssp. n. seems to be a useful biostratigraphic tool (Fig. 1).

In the Taučionys Formation of the Iljinskoje core the assemblage of chitinozoans resembles that in Lithuania (Нылвак, 1988). The taxonomic composition differs conspicuously from that in the underlying beds (below 492.0 m). Among others, some specific taxa with restricted stratigraphic ranges can be discussed, especially *Conochitina gamachiana* Achab and *Coronochitina secunda* sp. n. The latter is morphologically transitional between *Coronochitina coronata* Eisenack (widely distributed in the middle Pirgu) and "*Conochitina*" *taugourdeaui* Eisenack. It is based on a gradual change in the nature of ornamentation by which these taxa are distinguished and could be interpreted as evolutionary lineages (see also Melchin, Legault, 1985). It is proposed here that *Conochitina gamachiana* evolved into *C. postrobusta* ssp. n. (typical to Kuldiga Formation with *Hirnantian* macrofauna in Latvia) through an intermediate form (*C. cf. gamachiana*) near the upper boundary of these beds (Fig. 1).

Among graptolites *Orthograptus gracilis* (Roemer) is distinguished. This species has been also found in the Lithuanian cores from the same unit and it seems to indicate the graptolite zone of *Dicellograptus anceps* (see Skoglund, 1963; Мянниль, 1976).

The chitinozoan assemblage with "*C.*" *taugourdeaui* in the 3rd part is similar in many respects to that of the probably contemporaneous deposit in North-East Lithuania (e. g. in the Butkunai core). These beds were considered comparable with the Kuldiga Formation (Пашкевичюс, 1973; Лашков et al., 1984). No far-reaching conclusion can be drawn on a single section, but it is apparent, however, that approximately at a

depth of 479.1 m, there are transitional changes in lithology (see above) and also in the distribution of chitinozoans.

The topmost Ordovician deposits (int. 474.0—469.8 m) are lacking all kinds of organic-walled microfossils. The absence of chitinozoans is more likely due to the lack of suitable sediments for preservation (probably deposited in a high energy environment, and also the dolomitization of the rocks), as it is in the lowermost Porkuni (Rõa Member) in North Estonia.

In the Iljinskoje core the Upper Ordovician macro- and microfossils studied allow to presume the Pirgu age of the Taučionys Formation, which is characterized by the occurrence of the *Holorhynchus*. These *Holorhynchus* beds in the East Baltic are comparable with the analogous beds in Norway, but for their stratigraphic relationship we do not have an unambiguous settlement as yet. In our section the Ordovician strata succeeding the Taučionys Formation are characterized by the transitional fauna between the faunas of the Pirgu and Porkuni age, mostly in the North East Baltic.

The authors are indebted to E. Sammet (Sevzapgeologia, Leningrad) for the possibility to study the core of the borehole. We express gratitude to our colleague L. Sarv for his help in collecting the samples and studying ostracodes, and to H. Nestor for the identification of corals. Thanks are due to D. Kaljo for the critical reading of the manuscript.

REFERENCES

- Brenchley, P. J., Cocks, L. R. M. Ecological associations in a regressive sequence: the latest Ordovician of the Oslo-Asker district, Norway // *Palaeont.*, 1982, 25, Part 4, 755—781.
- Cocks, L. R. M. The commoner brachiopods of the latest Ordovician of the Oslo-Asker district, Norway // *Palaeont.*, 1982, 25, Part 4, 783—815.
- Henningsmoen, G. Upper Ordovician ostracodes from the Oslo region, Norway // *Nor. Geol. Tidsskr.*, 1954, 33, N 1—2, 69—108.
- Jaanusson, V. The Siljan district // *Field Excursion Guide*. D. L. Bruton, S. H. Williams (eds). IV Int. Symp. Ordovician System. *Paleont. Contr. Univ. Oslo*, 1982, N 279, 15—29.
- Kaljo, D., Nestor, H., Põlma, L. East Baltic region // *Bull. Br. Mus. Nat. Hist. (Geol.)*, 1988, 43, 85—91.
- Melchin, M., Legault, J. A. Evolutionary lineages in some Ordovician Chitinozoa // *Palynology*, 1985, 9, 199—210.
- Skoglund, R. Uppermost Viruan and Lower Harjuan (Ordovician) stratigraphy of Västergötland and Lower Harjuan graptolite faunas of Central Sweden // *Bull. Geol. Inst. Univ. Upps.*, 1963, 42, 1—55.
- Брангулис А. П., Кала Э. А., Киснерюс Ю. Л. Палеозойская группа // *Геология республик Советской Прибалтики*. Сводная объяснительная записка к геологическим картам масштаба 1 : 500000. Л., 1982.
- Гайлите Л. К. Остракоды кулдигской пачки верхнего ордовика Латвии // *Палеонтология и стратиграфия Прибалтики и Белоруссии*. II. Вильнюс, 1970, 19—31.
- Лашков Е. М., Пашкевичюс И. Ю., Сидаравичене Н. В. Литостратиграфия ордовикских отложений Средне-Литовского прогиба // *Стратиграфия древних отложений Прибалтики*. Таллин, 1984, 77—93.
- Мянниль Р. М. История развития Балтийского бассейна в ордовике. Таллин, 1966.
- Мянниль Р. М. Распределение граптолоидей в карбонатных отложениях ордовика. Прибалтики // *Граптолиты и стратиграфия*. Таллин, 1976, 105—118.
- Нылвак Я. Хитинозой верхнего ордовика Средне-Литовского прогиба // *Деп. в ВИНТИ* 01. 11. 88, № 7811-B88.
- Пашкевичюс И. Ю. Стратиграфическая ревизия силурийских карбонатных отложений Южной Прибалтики // *Вопросы геологии Литвы*. Вильнюс, 1963.
- Пашкевичюс И. Ю. Биостратиграфия и корреляция силурийских терригенных отложений Южной Прибалтики // *Стратиграфия нижнего палеозоя Прибалтики и корреляция с другими регионами*. Вильнюс, 1968, 250—272.
- Пашкевичюс И. Ю. Биостратиграфия, корреляция и границы ордовикских и силурийских отложений Южной Прибалтики. Автореф. докт. дис. Вильнюс, 1973.

Решения межведомственного стратиграфического совещания по ордовику и силуру Восточно-Европейской платформы 1984 г. с региональными стратиграфическими схемами. Л., 1987.

Сарв Л. И., Мейдла Т. Р. Особенности распространения остракод в пограничных отложениях ордовика и силура Северной Прибалтики // Деп. в ВИНТИ 10. 05. 84. № 3813-84.

Ульст Р. Ж., Гайлите Л. К., Яковлева В. И. Ордовик Латвии. Рига, 1982.

Хинтс Л. Брахиоподы Enteletacea ордовика Прибалтики. Таллин, 1975.

Academy of Sciences of the Estonian SSR,
Institute of Geology

Received
Jan. 4, 1989

J. NÖLVAK, T. MEIDLA, Linda HINTS

**TAUČIONYSE KIHISTU (*HOLORHYNCHUS*'E KIHID) ILJINSKOJE
PUURSÜDAMIKUS (PIHKVA OBLAST)**

Esitatakse Taučionyse kihistu (*Holorhynchus*'e kihtide), selle lasumi ja lamami paleontoloogiline iseloomustus Iljinskoje läbilõikes (Pihkva oblasti kaguosa). Taučionyse kihistu ostrakoodide ja kitinozoade kompleks, millega kaasneb spetsiifiline makrofossilide assotsiatsioon, on seotud pürgualise faunaga. Taučionyse kihistul lasuvates ordo- viitsiumialistes kihtides on kindlaks tehtud Pirgu ja Porkuni lademe piirikihtide fauna.

Я. НЫЛВАК, Т. МЕЙДЛА, Линда ХИНТС

**ТАУЧЕНСКАЯ СВИТА (СЛОИ С *HOLORHYNCHUS*) В РАЗРЕЗЕ
СКВАЖИНЫ ИЛЬИНСКОЕ (ПСКОВСКАЯ ОБЛАСТЬ)**

Установленный в таученской свите комплекс остракод и хитинозой, который сопровождается специфической ассоциацией макрофоссилий, связан с фауной пиргуского возраста. Установлена фауна пограничных слоев пиргуского и поркуниского горизонтов в надстилающих таученскую свиту ордовикских отложениях.