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CORRELATION OF THE *PROETUS SIGNATUS* LEVEL (UPPER SILURIAN) IN GOTLAND, POLAND AND THE EAST BALTIC AREA

H. ALBERTI, Lieselotte ALBERTI, Reet MÄNNIL, Ewa TOMCZYKOWA. *PROETUS SIGNATUS*'E TASEME (ÜLEMSILUR) KORRELATSIOON GOTLANDIL, POOLAS JA IDA-BALTIKUMIS

Г. АЛЬБЕРТИ, Лизелотте АЛЬБЕРТИ, Рэет МЯННИЛЬ, Эва ТОМЧИКОВА. КОРРЕЛЯЦИЯ УРОВНЯ *PROETUS SIGNATUS* (ВЕРХНИЙ СИЛУР) НА О. ГОТЛАНД, В ПОЛЬШЕ И ПРИБАЛТИКЕ

For the correlation of Baltic Silurian sections mainly ostracodes, graptolites, brachiopods, etc. have been used. Relatively little attention has so far been paid to trilobites. This is partly due to insufficient study, but at present the situation in this respect is greatly improving. The authors' studies of trilobites from Gotland (Alberti), Poland (Tomczykowa) and the East Baltic (Männil) yield important data for correlation. In this note we shall mainly deal with the distribution of the species *Proetus signatus* Lindström.

On Gotland this trilobite species has mostly been found in the upper part of the Burgsvik Beds, from where also Lindström's type material derived (Lindström, 1885). New studies (Alberti) show that *P. signatus* s. l. occurs there from the Eke Marl to the Sundre Limestone inclusive, whereas certain morphological varieties (distinguished here as subspecies) are distributed as follows: subsp. 1 occurs in the Eke Marl, *P. signatus* s. str. in the Burgsvik and Hamra Beds and subsp. 2 in the Sundre Limestone. It should be noted that we have *P. signatus* and *Acastella prima* Tomczykowa together in the upper part of the Burgsvik Sandstone and Oolite. Above the oolites we have recorded an *Acastella* species which may be interpreted as phyletically transitional between «*prima*» and «*dayiana*».

In Poland the occurrence of *P. signatus* has been recorded in a number of Silurian sections in the platform area as well as in the Holy Cross Mountains. In the boring of Lebork IG-1 in northern Poland *P. signatus* s. str. occurs together with *Calymene beyeri* Richter et Richter in the interval between 1123 and 1134 m, containing also *Monoclimacis ultimus*, thus without doubt within the limits of the *ultimus* Zone (Fig. 1). *Acastella prima* has been found higher in the same boring, between 1040 and 1080 m, together with *Neobeyrichia incerta* Gailite, i. e., all mentioned trilobite species occur in the *Neobeyrichia incerta*—*Acastella prima* Zone (the lowermost zone of the Lower Podlasie Stage; Tomczykowa, Witwicka, 1974). It should also be mentioned that in this boring *Monograptus balticus* occurs between 1778 and 1882 m. Above this interval *Formosograptus* ex gr. *formosus*, and in the upper part of the Upper

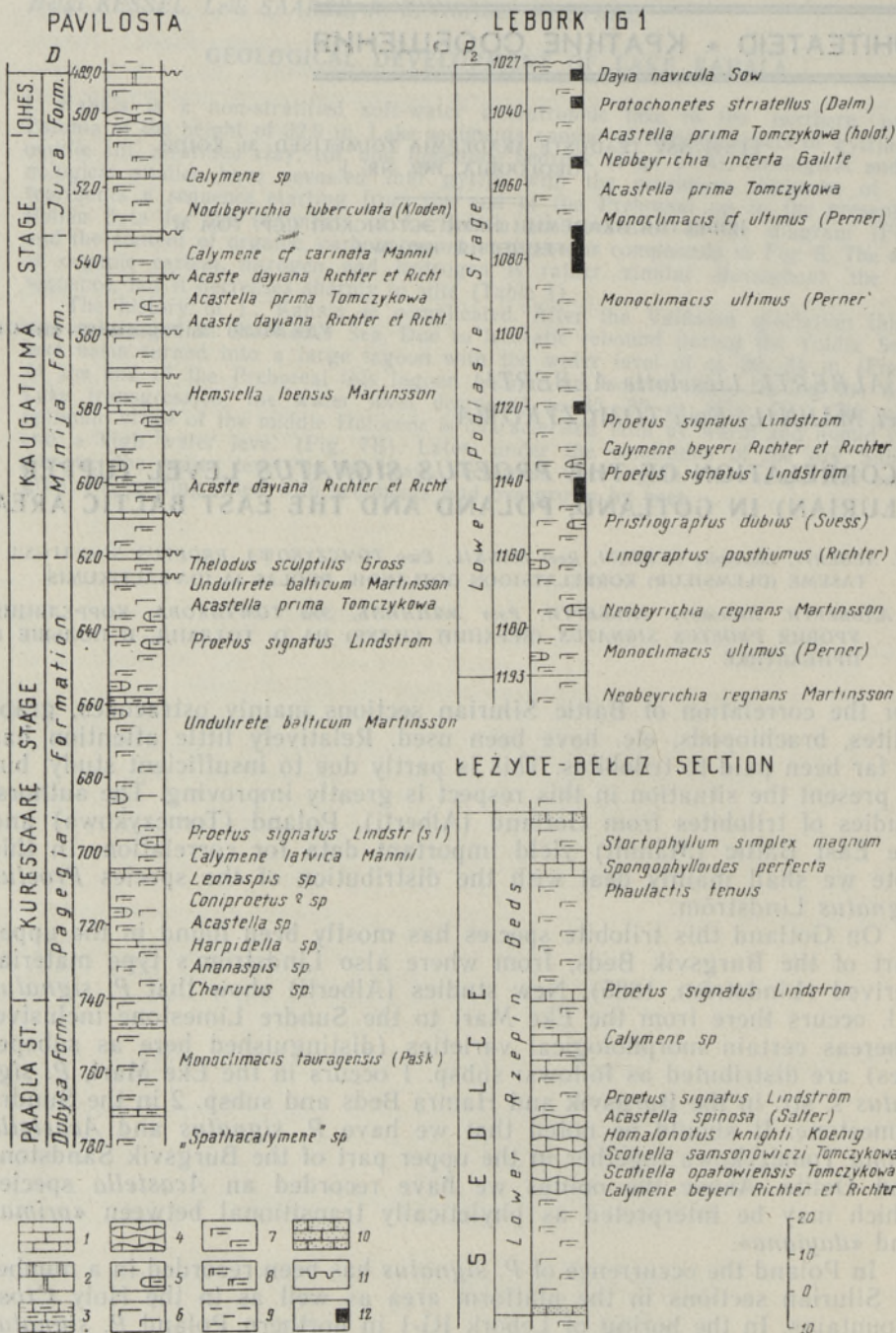


Fig. 1. Sections of the boreholes Pavilosta, Lebork IG-1 and outcrop at Leżyce-Belcz in the Holy Cross Mountains. 1 — limestone; 2 — dolomite; 3 — argillaceous limestone; 4 — nodular limestone; 5 — calcareous marl (mudstone) with limestone nodules; 6 — calcareous marl (mudstone); 7 — calcareous claystone and siltstone; 8 — argillaceous domerite (dolomitic claystone); 9 — clay; 10 — graywacke; 11 — discontinuity surface; 12 — uncored interval.

Siedlce Stage *F. formosus* as well as *Neobeyrichia alia* Gailite and *Neobeyrichia regnans* Martinsson have been found.

In the Holy Cross Mountains *P. signatus* s. str. has been identified in the

Great Britain	Graptolite Zones	Gotland	East Baltic Area (Latvia, Lithuania)	North and East Poland	Holy Cross Mountains
DOWNTON	LBD	ultimus	Kaugatuma Form.	Podlasie Lower	
			Minija Form.	Acaste <i>dayiana</i>	Acaste <i>sp.</i>
LUDLOW	Whitcliffian	formosus	Kureessaare Form.	Podlasie Upper	
			Pagejal Form.	Acastella <i>prima</i> Proetus <i>signatus</i>	Proetus <i>signatus</i> Homalonotus <i>knighti</i> Acastella <i>cf. prima</i>
Garthian Lit.+Brigg Leintwardi- ensis	Neo-cucullograptinae		Byggs-Hamra Sundre	Siedlce Upper	
			Proetus <i>signatus</i> subsp. 2		
Hemse		Fokel	Paajala Form.	Siedlce Lower+Middle	
			Dubysa Form.	Calymene <i>neointermedia</i> Encrinurus <i>macrourus</i>	
Garthian Lit.+Brigg Leintwardi- ensis	tumescens		Hemse	Wydryszow	
			Calymene <i>neointermedia</i>	Pragowiec	Encrinurus <i>sp.</i> Dalmanites <i>sp.</i>
Garthian Lit.+Brigg Leintwardi- ensis	scanicus nilssoni		Dalmanites <i>obtusus</i>	Dalmanites <i>tuberculato-caudatus</i> (s.l.)	

Fig. 2. Correlation of the Ludlow and Lower Downton beds of Gotland, East Baltic and Poland (according to Kaljo, 1978; Tomczyk, 1964; Tomczykowa, Witwicka, 1974). The *formosus* and *ultimus* Zones are shown according to E. Tomczykowa's interpretation.

Lezyce-Belcz section, where it occurs together with *Acastella spinosa* (Salter), *Homalonotus knighti* Koenig, *Scotiella samsonowiczi* Tomczykowa, etc. (Fig. 1). The section belongs to the Lower Rzepin Beds and correlates with the upper part of the Whitcliffian (Shergold, 1967; Tomczykowa, 1975). In the boring Potok IG-1, situated about 70 km to the east of the Lezyce-Belcz section, the form referable to *P. signatus* s. str. has been found at the depth of 1095 m, together with a faunal assemblage typical of the Lower Rzepin Beds. Higher in the same boring (828—1027 m) *Monoclimacis ultimus* occurs, as well as abundant *P. cf. signatus*, *Acastella prima*, *Calymene beyeri* (s.l.) and other benthic forms.

In the East Baltic area *P. signatus* has been found in a number of borings (Pavilsta, Piltene, Girdžiai-37, Girdžiai-50, etc.). Part of these specimens shows a certain morphological variation which is evidently, at least partly, to be explained by facial conditions. *P. signatus* s. str. is numerous in relatively shallow-water marls in the Girdžiai-37 (1070—1096 m) and Girdžiai-50 (1087.5—1107 m) borings in southern Lithuania, obviously belonging to the Kureessaare Stage (according to finds of ostracodes *Kureessaaria circulata* (Neckaja), *Neobeyrichia alia* Gailite, etc., identified by L. Sarv). *P. signatus* is associated here with *Calymene* sp., *Harpidella* sp. and *Acaste* sp.

In West Latvia *P. signatus* is numerous in the Pavilsta boring, occurring frequently in greenish-grey marls at 695—731 m (Fig. 1). This interval lies immediately above the *Monoclimacis tauragensis* Zone and evidently belongs also to the Kureessaare Stage, according to the ostracodes (*Scaldianella personata* (Krause), *Sleia equestris* Martinsson, etc.) and chitinozoans identified by L. Sarv and V. Nestor. The form found here differs from the typical one (wider anterior border of cranidium,

etc.) and evidently represents a facies-controlled variety. It is accompanied by rich fauna of relatively deep-water, mostly not yet described species, inter alia *Calymene latvica* Männil, *Ananaspis* sp., *Cheirurus* sp., *Harpidella* sp., etc. Trilobites are scarce immediately above this complex, but *P. signatus* is again found in the interval of 630—663.6 m, coinciding to some extent with the range of *Acastella prima* (625—639 m). This interval belongs also to the Kuressaare Stage, as the uppermost find of *Thelodus sculptilis* Gross comes from the depth of 625 m and *Undulirete balticum* Martinsson is found at 633.2—667.2 m (according to the unpublished data by T. Märss and L. Gailite). It should be said that *Acastella prima* or a closely related species occurs in the Pavilosta boring also at a higher level (547—522 m), almost side by side with *Acaste dayiana* Richter et Richter and other species characteristic of the Kaugatuma Stage.

From the above-said it follows that *Proetus signatus* is mostly distributed in the *formosus* and *ultimus* Zones; only in places, due to the facial conditions or perhaps to different stratigraphical interpretations, it is found slightly below the lower boundary of the *formosus* Zone (Kuressaare Stage), mainly as a non-typical subspecies. Besides, it appears that also some other Late Silurian trilobites have a high correlational value in this area, inter alia a deepwater «*Spathacalymene*» and *Encrinurus macrourus* Schmidt from the Ludlovian and *Acaste dayiana* Richter et Richter from the Downtonian (Fig. 2). Due to their wide geographical distribution and relatively frequent occurrence, these species as well as *Proetus signatus* are good index fossils in the studied area.

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REFERENCES

- Kaljo, D. The Downtonian or Pridolian from the point of view of the Baltic Silurian. — ENSV TA Toim. Geol., 1978, 27, 5—10.
- Lindström, G. Förteckning på Gotlands Siluriska Crustacéer. — Öfvers Vetensk. Akad. Förh., 1885, 6, 37—100.
- Shergold, J. H. A revision of *Acastella spinosa* (Salter 1864) with notes on related trilobites. — Palaeontology, 1967, 10, 2, 175—188.
- Tomczyk, H. Silurian stratigraphy in Northeastern Poland. — Kwart. geol., 1964, 8, 506—523.
- Tomczykowa, E. O trylobicie *Acastella prima* n. sp. — Kwart. geol., 1962, 6, 260—266.
- Tomczykowa, E. The trilobite subfamily Homalonotinae from the Upper Silurian and Lower Devonian of Poland. — Acta Palaeont. Pol., 1975, 20, 3—46.
- Tomczykowa, E., Witwicka, E. Stratigraphic correlation of Podlasiian deposits on the basis of ostracodes and trilobites in the Peri-Baltic area of Poland (Upper Silurian). — Biul. Inst. Geol., 1974, 276, 55—84.

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