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SILURIAN JAWED POLYCHAETES FROM CORNWALLIS AND BAILLIE-HAMILTON ISLANDS, CANADIAN ARCTIC

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Scolecodonts, the elements of jaw apparatuses of polychaete annelids, are widespread and often abundant organic-walled microfossils in the Palaeozoic. With the introduction of biologically meaningful apparatus-based taxonomy (by, e.g., Kielan-Jaworowska, 1966), as opposed to the element-based one, study of palaeogeographical, palaeoecological and evolutionary aspects of the jaw-bearing polychaetes became possible.

The Silurian scolecodonts are rather well studied in the Baltic area (e.g., Hinde, 1882; Kielan-Jaworowska, 1966; Bergman, 1979, 1989, 1995; Eriksson, 1997), but only few accounts are from other regions (e.g., Eller, 1940; Mannil & Zaslavskaya, 1985). The present report is based on the material from Cornwallis and Baillie-Hamilton islands, Canadian Arctic. The scolecodonts are a by-product of microvertebrate bulk samples collected by the members of the geological expedition to the islands in 1994. Samples come the following sections: Baillie-Hamilton 2 (BH-2), Washington Point (WP), Cape Phillips (CP) and Read Bay (RB). Descriptions of the sections are provided by Marss *et al.* (1998); for the geological and stratigraphical background of the study area see Thorsteinsson & Uyeno (1980).

The most copious jawed polychaete fauna was recorded in the Přidoli of the RB section, where the number of isolated first maxillae exceeded 140 per 1 kg of sample. In other sections the frequency was much smaller. Probably the technique used for extracting phosphatic microfossils had resulted in a partial loss of the light fraction of insoluble residues, including the scolecodonts. For this possible bias, the present collection cannot directly be compared with samples processed especially for polychaete jaws.

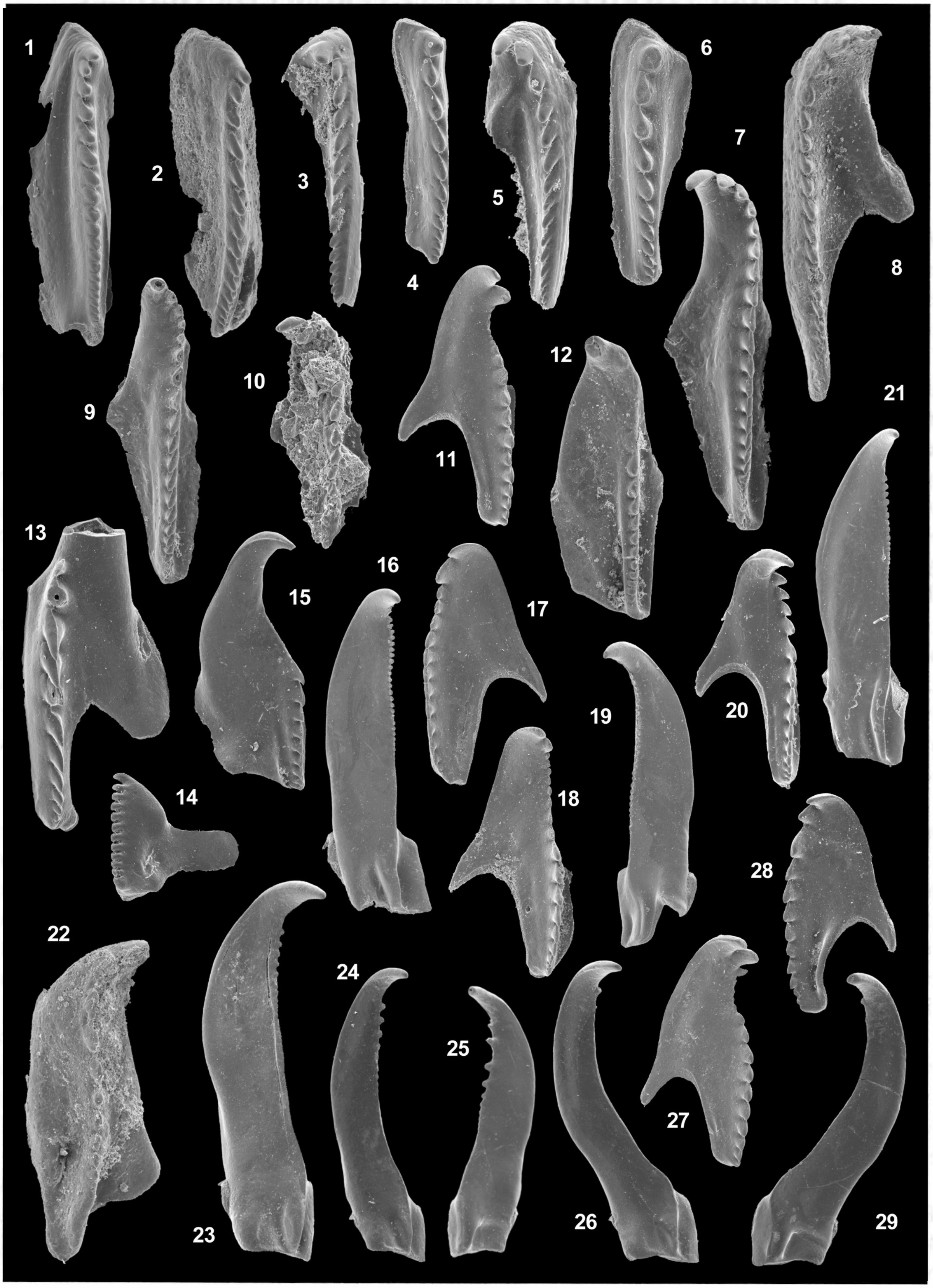
A competent species-level taxonomy of fossil jawed polychaetes can only be established when a large amount of material is available (e.g., Bergman, 1989; Eriksson, 1997; Hints 1998b). Different elements in the jaw apparatuses have a different taxonomic value and only some elements are characteristic at specific level. It is thus desirable to have all main jaw elements of a species represented in a sample to allow reasonable comparison with other taxa and to acquire information about the intraspecific variability. Although the present collection enables only some jaws recovered to be determined at specific level, the overall number of species is estimated to be between twenty and thirty.

Genera such as *Kettnerites* Zebera, *Oenonites* Hinde,,*Mochtyella* Kielan-Jaworowska, *Protarabellites* Stauffer, *Atraktoprion* Kielan-Jaworowska, *Pistoprion* Kielan-Jaworowska, *Vistulella* Kielan-Jaworowska, well-known from the Ordovician and Silurian of the Baltic area make up the core of jawed polychaete assemblages in the studied Canadian samples. Some characteristic forms are depicted in Plates; the most interesting finds are commented on as follows:

Few specimens of *Pistoprion serrula* (Hinde) are recorded from the Llandovery-Wenlock of the CP and BH-2 sections. This species is common in the same stratigraphical interval in Gotland (Bergman, 1979) and also in the Llandovery of Severnaya Zemlya (Mannil & Zaslavskaya, 1985). Possibly this species has also been found in England (Hinde, 1880).

Oenonites (= *Polychaetaspis* Kozlowski) ssp. is found throughout the studied interval likely embracing several species which cannot be confidently distinguished. According to the distinction by Kielan-Jaworowska (1966), they nevertheless belong to the group of *O. wyszogrodensis*. Jaws similar to those in the present collection have been described by Walliser (1960) as "*Polychaetaspis*

Plate



1 – *Mochtyella* sp.: right MI, UA 11941 (*UA = University of Alberta Paleontology Collection*), ×50, RB 141 m, Přidoli. **2** – *Mochtyella* ex. gr. *trapezoidea*: right MI, UA 11942, ×50, RB 64.5m, Přidoli. **4–5** – *Vistulella*? sp.: left MI, UA 11943, x60, BH-2 84m, Wenlock; 4 – right MI, UA 11944, ×75, BH-2 220.5 m, Ludlow. **5–6** – *Pistoprion serrula*: 5 – left MI, UA 11945, ×75, CP 18.5 m, Llandovery; 6 – right MI, UA 11946, ×45, BH-2 114 m, Wenlock. **7–10** – *Oenonites* ssp.: 7 – left MI, UA 11947, ×35, RB 0 m, Přidoli; 8 – right MI, UA 11948, ×35, RB 0 m, Přidoli; 9 – left MI, UA 11949, ×35, BH-2 397.5 m, Ludlow; 10 – left MI, UA 11950, ×75, WP -100 m, Lochkov?. **11** – *Langeites*? sp. A?: left MII, UA 11951, ×20, RB 64.5 m, Přidoli. **12** – *Protarabellites* sp.: left MI, UA 11952, ×60, BH-2 66 m, Wenlock. **13–14** – *Leptoprion*? sp.: CP 18.5 m, Llandovery; 13 – right MI, UA 11953, ×35; 14 – basal plate, UA 11954, ×35. **15** – *Atraktoprion*? sp.: left MI, UA 11955, ×50, BH-2 145.5 m, Wenlock. **16–19** – *Kettnerites* cf. *polonensis*: 16 – left MI, UA 11956, ×22, RB 87 m, Přidoli; 17 – right MII, UA 11957, ×22, RB 87 m, Přidoli; 18 – left MII, UA 11958, ×30, RB 87 m, Přidoli; 19 – right MI, UA 11959, ×22, RB 87 m, Přidoli. **20–21** – *Kettnerites* cf. *sisyphi*: left MII, UA 11960, ×45, BH-2 84 m, Wenlock. 21 – left MI, UA 11961, ×30, BH-2 66 m, Wenlock. **22** – *Symmetroprion spatiosus*: right MI, UA 11962, ×45, BH-2 114 m, Wenlock. **23** – *Langeites*? sp. A?: left MI, UA 11963, ×22, RB 64.5 m, Přidoli. **24–25** – *Langeites*? sp. A: RB 129 m, Přidoli: 24 – left MI, UA 11964, ×25; 25 – right MI, UA 11965, ×20. **26–29** – *Langeites glaber*: 26 – left MI, UA 11966, ×22; RB 129 m, Přidoli; 27 – left MII, UA 11967, ×30; RB 0 m, Přidoli; 28 – right MII, UA 11968, ×30; RB 64.5 m, Přidoli; 29 – right MI, UA 11969, ×20; RB 129 m, Přidoli.

cf. *wyszogrodensis* Kozlowski", however, closely related forms are also known from the Ordovician and Silurian of Baltoscandia (Eriksson, 1997; Hints, 1998b).

Symmetroprion spatiosus (Hinde) has been recorded in a few samples (Wenlock-Ludlow) from the BH-2 section. This species is common in the Wenlock and Ludlow of Gotland, where it shows particular preference to reefal and lagoonal environments (Bergman, 1995). The Canadian Arctic samples yielding *S. spatiosus* derive from debris flow interbeds within the graptolitic sequence. Therefore *S. spatiosus* was likely bound to relatively shallow-water facies in Canada too.

Paulinitids are among the most common Silurian jawed polychaetes (e.g., Bergman, 1979). At least four species occur in the samples studied from Canadian Arctic:

Kettnerites cf. *sisyphi* Bergman is represented by few jaws in the Wenlock of the BH-2 section. A closely related species, if not the same one, is widespread in Gotland and Severnaya Zemlya (cf. Bergman, 1989, p. 26).

Kettnerites cf. *polonensis* (Kielan-Jaworowska) is found in abundance in two Přidoli samples from the RB section. The characteristic right MII may have a varied dental formula: unlike the illustrated specimen (see Plate, 17), most MII jaws possess a cusp and two large precuspidal denticles.

Langeites? sp. A occurs abundantly, together with *Langeites glaber*, in Přidoli samples from the RB section. The second maxillae of this species show great similarity to those of *L. glaber*. The first maxillae are very similar to the few almost straight specimens described as *Langeites glaber* by Bergman (1989) from the lower Ludlow of Gotland, but differ in having a basal plate fused with the right MI. On the other hand, the first maxillae show very close resemblance to those of *Kettnerites*, which is the reason for assigning this species only tentatively to *Langeites*.

Langeites glaber Kielan-Jaworowska occurs with varying frequency throughout the Přidoli of the RB section. In some samples it predominates over other species. In the Silurian of the Baltic Region, from where other occurrences of *L. glaber* are known, only rare specimens are found in the upper Ludlow.

Several Silurian species common to Arctic Canada, the Baltic area and Severnaya Zemlya indicate close relationship of polychaete faunas of these regions. This paper is among the few reports of inter-regional distribution of fossil jawed polychaetes. The present material is not adequate for discussing the stratigraphical distribution of particular taxa in detail, or for making any sound conclusion about the stratigraphical subdivision; however, in a broad scale, there is a consistency in occurrences of particular species. For example, *Langeites glaber* is found from the Přidoli of Canadian Arctic and the top Ludlow of Gotland – it has never been recorded in older strata; *Pistoprion serrula* is found from the Llandovery-Wenlock and probably does not extend to the Ludlow-Přidoli. The studied Canadian Arctic material also confirms that the shallower-water conditions have provided the most favourable habitats for the majority of jawed polychaetes (see also Bergman, 1989).

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References

BERGMAN, C.F. 1979. Polychaete jaws. – In Jaanusson, V., Laufeld, S., Skoglund, R. (eds.): Lower Wenlock faunal and floral dynamics – Vattenfallet Section, Gotland. *Sveriges Geologiska Undersökning* C 762: 92-102.

BERGMAN, C.F. 1989. Silurian paulinitid polychaetes from Gotland. – *Fossils and Strata*, **25**: 1-127.

BERGMAN, C.F. 1995. *Symmetroprion spatiosus* (Hinde), a jawed polychaete showing preference for reef environments in the Silurian of Gotland. – *GFF* **117**: 143-150.

ELLER, E.R. 1940. New Silurian scolecodonts from the Albion Beds of the Niagara Gorge, New York. – *Annals of the Carnegie Museum* **28**: 9–46.

ERIKSSON, M. 1997. Lower Silurian polychaetaspid polychaetes from Gotland, Sweden. – *GFF* **119**: 213–230.

HINDE, G.J. 1880. On annelid jaws from the Wenlock and Ludlow Formations of the west of England. – *The Quarterly Journal of the Geoilogical Society of London* **36**: 368–378.

HINDE, G.J. 1882. On Annelid remains from the Silurian strata of the Isle of Gotland. – *Bihang till Kungliga Vetenskapsakademiens Handlingar* **7**(5): 3–28.

HINTS, O. 1998a. Revision of the Ordovician and Silurian ramphoprionid polychaetes from Severnaya Zemlya, Russian Arctic. – *Proceedings of the Estonian Academy of Sciences. Geology*, **47**: 77–85.

HINTS, O. 1998b. Late Viruan (Ordovician) polychaete jaws from North Estonia and the St. Petersburg Region. – *Acta Palaeontologica Polonica* **43**: 471–516.

KIELAN-JAWOROWSKA, Z. 1966. Polychaete jaw apparatuses from the Ordovician and Silurian of Poland and comparison with modern forms. – *Palaeontologia Polonica* **16**: 1–152.

MÄRSS, T., CALDWELL, M., GAGNIER, P.-Y., GOUJET, D., MÄNNIK, P., MARTMA, T & WILSON, M. 1998. Distribution of Silurian and Lower Devonian vertebrate microremains and conodonts in the Baillie-Hamilton and Cornwallis Island sections, Canadian Arctic. – *Proceedings of the Estonian Academy of Sciences. Geology*, **47**: 51–76.

MÄNNIL, R.M. & ZASLAVSKAYA, N.M. 1985. Silurian polychaetes from the northern Siberia. – *Trudy Instituta Geologii i Geofiziki SO AN SSSR*, **615**: 98–119: [in Russian].

THORSTEINSSON, R. & UYENO, T.T. Stratigraphy and conodonts of Upper Silurian and Lower Devonian rocks in the environs of the Boothia Uplift, Canadian Arctic Archipelago. – *Geological Survey of Canada Bulletin* **292**: 1–75.

WALLISER, O.H. 1960. Scolecodonts, conodonts and vertebrates. - In Boucot, A. J. *et al.* (eds.): A late Silrian fauna from the Sutherland River Formation, Devon Island. Canadian Arctic Archipelago. *Bulletin of Geological Survey of Canada*, **65**: 21–39.