PALAEONTOGRAPHIA ITALICA

RACCOLTA DI MONOGRAFIE PALEONTOLOGICHE
FONDATA DA MARIO CANAVARI NELL'ANNO 1895

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Proetid trilobites from the Silurian (Wenlock-Ludlow) of the Cape Phillips Formation, Canadian Arctic Archipelago

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KEY WORDS – Trilobites, Silurian, Laurentia, taxonomy

ABSTRACT – Carbonate debris flow deposits in the graptolitic Cape Phillips Formation of the central Canadian Arctic Archipelago yield rich, silicified trilobite faunas, and preserve the most diverse and complete record of Wenlock trilobites known from anywhere in the world. Six stratigraphically successive trilobite faunas have been identified, ranging in age from mid-Sheinwoodian to earliest Ludlow. The trilobites occur in strata interbedded with mudrock/shale rich in well preserved graptolites. As a result, their ages are known with precision.

Proetid trilobites are the most diverse element of the trilobite faunas. This work describes all taxa of Proetidae and Tropidocoryphidae recovered from large silicified samples. At least 42 proetid species assigned to 9 genera are present. Twenty-six species are well enough known for formal naming (of which one has previously been named), while the remainder are described in open nomenclature.


INTRODUCTION

Proetoids are the most diverse and longest lived of the major trilobite groups, with a range from the earliest Middle Ordovician (White- rockian) to the end of the Permian. They have received an enormous amount of historical taxonomic attention, yet no truly definitive account of their evolution or classification has emerged. This may be due in part to the fact that studies have tended to be presented in gradistic terms, laden with expressly paraphyletic taxa. Also problematic is an historical tendency for the establishment of a great many rather poorly founded genera. At least as significant, however, is the simple paucity of information from the Ordovician-Silurian time interval during which the proetoids radiated and during which basal relationships were established.

Although tropidocoryphids may be locally important in the Ordovician, it is not until the Silurian that the proetoids become dominant and diverse faunal elements. In contrast with several other major groups, Silurian proetoids remain relatively poorly known. In major faunas which have provided the basis for synthetic revisions of other taxa, the proetoids are often the primary group that has not received significant modern attention. This is true of both the superb Silurian trilobite faunas of Gotland, Sweden, and the silicified faunas of the Mackenzie Mountains of northwestern Canada. In both of these cases, diversity of, for example, Encrinuridae (Ramsköld, 1986; Edgecombe & Chatterton, 1990, 1993; Edgecombe & Ramsköld, 1992, 1996; Ramsköld & Edgecombe, 1994) and Odontopleuridae (Chatterton & Perry, 1983; Ramsköld, 1984) have been central to an improved understanding of phylogeny, but the proetoids, which are among the most diverse faunal
elements, are essentially undescribed. The best works on regional Silurian proetid faunas remain those of Owens (1973) and Thomas (1978) on British diversity.

The present study is intended primarily to contribute new systematic data to the problem, through comprehensive description of the proetids and tropidocoryphids recovered from the Wenlock and Ludlow of the Cape Phillips Formation of the east-central Canadian Arctic. Trilobite faunas from this graptolitic shale unit typically occur in debris flow deposits derived from the nearby margin of the Arctic Platform. Description of these faunas was initiated by Perry & Chatterton (1977), based on collections made from southern Baillie-Hamilton Island by A.J. Boucot and R. Thorsteinsson in 1971. Subsequent collections from Baillie-Hamilton Island and Cornwallis Island were made by Chatterton and colleagues in 1976-1979, some material of which was described by Chatterton & Perry (1979). The present work is based almost entirely on large collections made during the 1991-1993 field seasons from two localities, on southern Baillie-Hamilton and northwestern Cornwallis Islands (fig. 1). Studies have been carried out on the ichnids (Adrain, 1994; Adrain & Ramsköld, 1996), odontopleurids (Adrain & Ramsköld, 1997), encrinurids (Adrain & Edgecombe, 1995, in press), calymenids (Adrain & Edgecombe, 1997), cheirurids (Adrian, in press) and phacopids (Adrain & MacDonald, 1996). The present work describes all of the proetodean trilobites recovered from the silicified samples.

**LOCALITY AND STRATIGRAPHY**

Locality information for the Cape Phillips Formation sections and samples dealt with herein has been published several times. Adrain & Edgecombe (in press) have given comprehensive details, and summaries have been published by Adrain & Edgecombe (1997) and Adrain & Ramsköld (1996, 1997). Therefore, only a concise account is given herein.

The Cape Phillips Formation (Thorsteinsson, 1958) is a basinial graptolitic shale unit of Late Ordovician to Early Devonian age, deposited atop a drowned Upper Ordovician carbonate ramp (Irene Bay Formation). The formation has quite a broad area of outcrop in the east-central Arctic Archipelago, occurring in general palaeotopo- graphic terms between carbonates of the Arctic Platform to the south and east and deep water sha- les of the Hbett Bay Formation to the west and Danish River and Hazen formations to the north and northwest. In situ benthic faunas, including some deep-water trilobites (Ludvigsen, 1979; Adrain & Chatterton, 1990) are known from the formation, but are rare and occur at only a few horizons. The unit is, however, rich in the remains of pelagic organisms, including diverse and well preserved graptolite faunas (Melchin, 1987; Lenz & Melchin, 1990, 1991; Lenz 1990, 1995). Shelly benthic faunas of the adjacent Arctic Platform are difficult to recover in situ, as most of the Llandovery and Wenlock carbonates (Allen Bay Formation) have been secondarily dolomitized.

The platform edge during Wenlock and early Ludlow times was evidently quite abrupt, and is now marked by a lateral facies shift from dolomites and dolomitic limestone to Cape Phillips Formation shale. This transition can be traced across the east-central Arctic (dotted line in fig. 1a). In several areas, there are preserved near to this line of facies transition a series of limestone debris flow deposits derived from the distal part of the platform. These deposits are of key importance, because they are not dolomitized. In addition, bioclasts in the deposits are often silicified. As they are event beds, they preserve records of individual species that are likely to be close approximates of contemporaneous living populations. Finally, the debris flow deposits are typically found interbed- ded with shales rich in diagnostic graptolites, allowing excellent biostratigraphic control. Taken together, the debris flow deposits preserve a series of faunas that have otherwise been lost through dolomitization. The trilobite faunas from the depo- sits are the most diverse, most numerous, most finely stratigraphically resolved, and among the best preserved known from anywhere in the world.

Intensive sampling was carried out at two localities with well-exposed sections containing numerous stratigraphically successive debris flow depo- sits (fig. 1). Sections on Baillie-Hamilton Island (fig. 2a) and northwestern Cornwallis Island (fig. 2b) contain silicified faunas ranging in age from mid-Silurian to early Ordovician. The graptolite zonation used herein is that established by Lenz & Melchin (1990, 1991) and Lenz (1990, 1995). Adrain & Edgecombe (in press; also Adrain & Ramsköld, 1997) have documented a stratigraphically successive sequence of trilobite faunas (each named for their most representative taxon), which yield biostratigraphic resolution approximately equal to that of the graptolites. Information from the proetoid occurrences herein (figs. 3, 4) further strengthens this preliminary biozination. An upper Sheinwoodian fauna which has hitherto been termed «Unnamed Fauna 1» (Adrain & Edgecombe, 1997, in press; Adrain & Ramsköld, 1997) is here named the *Pseudogerastos rossi* Fauna, for the proetid species that is its most common and characteristic component.

A list of the distinct Cape Phillips Formation species described herein is given in Table 1.

**SYSTEMATIC PALAEONTOLOGY**

Terminology: Morphological terms are applied in standard fashion, except for the following: The term *rhynchos* is commonly used for variously pro- duced median swellings on the hypostomal middle body of other groups. The encrinurid *rhynchos* is an anterior projection, whereas that of calymenids is a ventrally directed protuberance that is often developed as a median keel. The latter type of structure is common in proetid hypostomes, and I refer to it herein as a *rhynchos*.

The term *eye socket* is commonly used to refer to
Fig. 1 - A, Geographical position of localities (AB = Cape Phillips Formation, Abbott River sections ABR 1-2, talus boulders ABR TT-D, ABR TT'; BH = Cape Phillips Formation, Baillie-Hamilton sections BH 1, BHL 1, and BH 2, locality BII). Dashed line represents the approximate line of facies change from platform carbonates to the east and southeast to basinal shales to the west and northwest. B, Details of sections and collecting localities on a small, northerly-flowing tributary of the Abbott River (ABR of 1A), northwestern Cornwallis Island. C, Details of sections and collecting localities on the south shore of Baillie-Hamilton Island (BH of 1A).

a prominent, smooth inflated area subjacent to the eye. The morphology of the socle varies. In proetid groups it is typically developed as a single, contiguous, narrow band. In tropidocoryphids (and other proetid groups) the structure can be more complex, involving independently inflated anterior and
but subdivided the posterior lobes, sometimes in addition to an adaxial band. In proetids, there are often further structures developed abaxial to the swollen eye socle. Typically, there is a concave area of depressed tuberculation and finer caecal pitting. This area may have a sharp lateral contact with the main body of the librigenal field. In many species this is reflected as an abrupt change in sculpture, but in some taxa there is developed a prominent ridge along the contact (e.g., Gerastos espectatus Pribyl, 1964; see Snajdr, 1980, pl. 4, fig. 17). In advanced taxa (e.g., Dechenella granulata Ormiston, 1967, pl. 11, figs. 1, 4, 7) this ridge may be carried over to the cranium, and developed on the frontal area. The ridge is entirely distinct from a trophiodium or trophoidal ridge, which is developed on the field and never directly associated with the boundary of the depressed eye area. The combined structure has in the past been termed the eye platform, a term which has also been applied to the socle itself. Herein the depressed and concave area developed adjacent to the eye socle is termed the subocular area and the bounding ridge, when developed, is termed the subocular ridge.

The terms "LO" and "occipital ring" and "SO" and "occipital furrow" are used interchangeably. In descriptions, length of glabella is always exclusive of the occipital ring.

In cases where cephalic doublure is broad and underlies more than one dorsal submarginal furrow, different terminologies have been employed. In cases where the doublure is assumed to have been developed adaxially beyond the dorsal border furrow, the dorsal furrow aligned with the inner edge of the doublure has been termed the paradoubuler line (Henningsmoen, 1960). The terms 'border' and 'border furrow' are then applied as normal. An alternative view is that the furrow matching the extent of the doublure is the true border furrow, and that any structures developed adaxially represent an epiborder and epiborder furrow. As a purely descriptive convention, the latter terminology is applied where necessary herein.

Repository: All illustrated specimens are housed in the collections of the Department of Palaeobiology, Royal Ontario Museum, Toronto, with specimen number prefix ROM.

Superfamily Proetoidea Hawle & Corda, 1847
Family Proetidae Hawle & Corda, 1847
Subfamily Proetinae Hawle & Corda, 1847

Genus Gerastos Goldfuss, 1843

Type species - Proetes cuvieri Steininger, 1831, Middle Devonian, Germany.

Diagnosis: Glabella inflated and primitively tuberculate; preglabellar field absent or very short; holaspisid genal spine reduced to thorn or lost; cephalic and pygidial borders with prominent subparallel terrace lines, between which occur single rows of small perforations; hypostome with striate middle body and prominent rhynchos, lacking posterior spines; thoracic segments slender (sag.; exsag.), with very strongly vaulted axis, large and strongly inflated preannular lobe; typically 7-8 pygidial axial rings, reduced to 6 in some advanced species.

Discussion: There exists a large group of species, primarily of Early Devonian age, with a characteristically vaulted cephalic morphology and greatly reduced or absent genal spines. There is also considerable Eifelian and younger diversity, but to this point very few Silurian species have been known. Proetes granulatus Lindström, 1885, is certainly a member, although it remains known from a single cephalon (see Schrank, 1972, pl.1, fig. 6; Owens, 1973, pl.2, fig. 3), and P. verrucosus Lindström, 1885 (see Schrank, 1972, pl.3, fig. 2), may also belong. Holloway (1980, p. 12) was first to point out that much of the northern Canadian material illustrated by Perry & Chatterton (1977) was probably related to Gerastos cuvieri. The material described herein makes clear that, at least in northern Laurentia, the group was well established by the mid-Wenlock. The excellent silicified material also reveals key morphological criteria, providing strong evidence that the overall group is monophyletic. In particular, the presence around both the cephalic and pygidial margins of prominent rows of pores would appear to be a potentially
Fig. 3 - Ranges of proctoidean species in the Cape Phillips Formation on the south shore of Baillie-Hamilton Island.

robust apomorphy. This feature has not previously been used to characterize a broad Gerastos group, due probably to the fact that it may require excellent preservation and adequate illustration to be evident. Nevertheless, with knowledge of the Canadian Silurian taxa, it becomes possible to recognize the marginal pore rows in published figures of Devonian Gerastos-group species, including, for example, G. liyi (Přibyl, 1964) (Snajdr, 1980, pl. 3, fig. 13) G. confragosus (Přibyl, 1965)
### ABBOTT RIVER NW CORNWALLIS ISLAND

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Fig. 4 - Ranges of procoenid species in Cape Phillips Formation strata near Abbott River, northwestern Cornwallis Island

(Snajdr, 1980, pl. 3, fig. 14), *G. cingulatus* (Přibyl, 1964) (Snajdr, 1980, pl. 4, fig. 12), and *G. rehmannius* (Alberti, 1969, pl. 3, fig. 6d). The structures are visible, though less clearly, on illustrations of many other species and there seems little question that they are a general feature of the group. Some species, particularly later, effaced taxa, may genuinely lack these pores. Secondary loss of the structure in derived species has no bearing, however, on the assertion that their presence is a basal apomorphy of the group.

Accepting the monophyly of this large species group, the question of its generic classification arises. *Gerastos* is certainly the oldest available name and its type species is relatively well known. A number of additional genera have been proposed to include species that seem very likely to be part of this group, *Dolioniella* Lütke, 1990, and *Kegelliella* Lütke, 1990, are exceedingly similar to *Gerastos*, *Myopreutes* Snajdr, 1976, and *Orbitopreutes* Pillet, 1969, appear to represent more or less effaced examples of the group. Snajdr (1980) treated
Gerastos Goldfuss, 1843
- G. melliashae n. sp. (upper Sheinwoodian)
- G. fosteri n. sp. (upper Sheinwoodian)
- G. sinus (Lane, 1984) (mid-Sheinwoodian)
- G. monstus n. sp. (lower Homerian)
- G. milleri n. sp. (upper Sheinwoodian)

Pseudogerastos Lütke, 1990
- P. fosteri n. sp. (upper Sheinwoodian)
- P. cockei n. sp. (mid-Sheinwoodian)
- P. rossi n. sp. (upper Sheinwoodian)
- P. taylori n. sp. (lower Homerian)

Heistromius Pribyl and Vaněk, 1978
- H. charloetteae n. sp. (upper Homerian)
- H. weedoni n. sp. (upper Homerian)
- H. n. sp. (Gorstian)

Thebanaspid Lütke, 1990
- T. morrisi n. sp. (upper Sheinwoodian)
- T. taddi n. sp. (upper Sheinwoodian)
- T. ratusi n. sp. (mid-Sheinwoodian)
- T. weshi n. sp. (upper Homerian)
- T. smithi n. sp. (lower Homerian)
- T. jefferyi n. sp. (lower Homerian)

Westropia n. gen.
- W. bedfieldi n. sp.
- W. skipperae n. sp.

Winiska Norford, 1981
- W. youngi n. sp. (mid-Sheinwoodian)
- W. curreni n. sp. (lower Homerian)
- W. longbottomae n. sp. (upper Sheinwoodian)

Coniproteus Alberti, 1966
- C. elliotiae n. sp. (upper Homerian)
- C. amphiellte n. sp. (upper Homerian)

Cyphoproteus Keaged, 1927
- C. n. sp. A (mid-Sheinwoodian)
- C. n. sp. B (upper Sheinwoodian)

Interoproteus Snajdr, 1977
- I. wellsi n. sp. (upper Sheinwoodian)
- I. n. sp. A (mid-Sheinwoodian)
- I. n. sp. B (upper Sheinwoodian)
- I. n. sp. C (lower Homerian)

**Gerastos melliashae n. sp.**
*Pl. 1, figs. 1-8; Pl. 2, figs. 1-18*

**Diagnosis:** Glabella narrow; anterior border furrow abaxially shallow; librigenal field exagittally elongate; cephalic margin with single row of pores; pygidium relatively elongate (sagittal length 60-62 percent width), with 8 axial rings.

**Description:** Cranidium with width across maximum point of divergence of anterior sections of facial sutures 80-82 percent width across mid-length (exsz.) of palpebral lobes; width across palpebral lobes 85-89 percent sagittal length; anterior sections of facial suture anteriorly convergent in front of palpebral lobes, diverging to form gently laterally convex margin, anteriorly convergent to mid-length of anterior border furrow; posterior sections of facial suture more or less exagittally straight, short opposite L1, diverging at nearly 90 degrees to exagittal plane to run to lateral extremity of posterior fixigena; axial furrow deep and narrow, deflected laterally around L1, increasingly anteriorly convergent anterior to L1, running into preglabellar furrow at abrupt, angular junction; preglabellar furrow nearly transversely straight (Pl. 1, figs. 1c, 2b); glabella with maximum width across L1, subequal to sagittal length; glabella inflated, anterior extent slightly behind anterior-most part of anterior border when L0 is held in vertical plane; glabellar furrows indistinct; S1 contacting axial furrow slightly anterior to midlength of palpebral lobe, running postero-medially as shallow, narrow groove; S2 impressed as slight notch opposite anterior end of palpebral lobe; L1 with one must suspect that a great deal of the early history of the clade remains to be discovered. Ultimately, it may be possible to subdivide the *Gerastos* group along defensible phylogenetic lines. Until such time, it seems preferable to refer the entire group, including all of the early Canadian species, to an undivided *Gerastos*.

Lütke (1990) erected *Devonoproetus* as a subgenus of *Gerastos*. The type species, *Proetus (Proetus) talenii* Chatterton, 1971, does not appear to bear any of the potential apomorphies of *Gerastos*, but instead features a non-vaulted, only moderately inflated glabella, long anterior border, large eye with subedged socle and narrow field, long genital spine, and hypostome with a pair of posterior spines. All arc features of *Proetus* s.s., of which *Devonoproetus* should probably be considered a subjective junior synonym. The species included by Lütke (1990) in *Devonoproetus* are of widely varying morphology, including some (e.g., *calyx* Richter & Richter, 1918) obviously belonging to *Gerastos* and one (*whittakerensis* Chatterton and Perry, 1977) which seems to be a straightforward representative of *Coniproteus* (see discussion under that genus below).

**Gerastos melliashae n. sp.**

1977 *Proetus* (s.1.) cf. *granulatus* Lindström, 1885 - Perry and Chatterton, p. 289, pl. 1, fig. 15 (non figs. 9-11, 16-18, 21-23 = *Gerastos fosteri* n. sp.; non figs. 12-14, 19, 20 = *Gerastos sinus* [Lane, 1984]).
very slight independent inflation; dorsal glabellar sculpture of evenly scattered fine to coarse tubercles; prominent smooth area set on laterally convex vertical sides of glabella adjacent to axial furrow (Pl. 1, fig. 1b); S0 similar in depth to axial furrow, deflected slightly posteriorly behind L1, describing shallow "M" shape medially, although median part of rear of glabella varies from slightly posteriorly convex (Pl. 1, fig. 1a; Pl. 2, figs. 1a, 2a) to transversely straight (Pl. 1, figs. 5a, 6b); L0 with small, weakly inclined lateral occipital lobes, set off from main part of ring by very wide, very longest sagittally, with dorsal sculpture of moderately to large tubercles similar in size to the largest on the glabella; median occipital node prominent, larger than any sculptural tubercles, set on posterior third of ring; sculpture absent from smooth area along anterior edge, adjacent to S0; L0 with gentle dorsal sagittal convexity; anterior border furrow relatively long (exssag.) and shallow; anterior border slightly shorter (sag.) than occipital rim, with moderate dorsal sagittal convexity; dorsal sculpture of 7-8 fine, subparallel terrace lines, more closely set near margin; prominent row of nearly evenly spaced perforations running in space between marginal and supramarginal terrace lines (Pl. 1, fig. 1b, 1c, 1e; Pl. 2, figs. 8a-b); frontal area subtriangular, with fine pits but only very subdued tuberculation (e.g., Pl. 1, figs. 3d, 6a); palpebral lobe narrow, abaxial part nearly horizontal, sloping steeply toward axial furrow; posterior fissigena with very small, subtriangular area bounded by axial and posterior border furrows; anterior portion of facial suture, with dorsal sculpture of fine pits, lacking tubercles; posterior border furrow relatively shallow, but short (exssag.), less incised than axial furrow; posterior border very short (exssag.), lengthening slightly between axial furrow and furculum, with rounded, subcylindrical dorsal convexity, lacking dorsal sculpture, foreshortened and deflected posteriorly abaxial to furculum.

Librigena with minimum width (tr.) of field 40-50 percent maximum length (exssag.); field with moderate, subduted tubercles concentrated in middle of area and prominent cactic pitting; pits finer and more densely distributed along lateral border furrow, transversely elongate and partially merged around eye socle (Pl. 2, fig. 8b); eye with length (exssag.) about twice height; eye socle of single, complete, prominent, inflated band with even, subcylindrical lateral convexity; prominent subocular area, but subocular ridge absent; posterior border furrow deeply incised, with slight posterior convexity; lateral border furrow broad and shallow, becoming less and less deep posteriorly, very nearly genal angle; posterior border with moderate dorsal convexity, length (exssag.) about 70 percent maximum width (tr.) of lateral border, sculpture of widely scattered very fine tubercles as well as 4-7 more prominent ones set posteriorly; lateral border broad and dorsally flattened, adaxial 40-45 percent smooth, abaxial part with 6-7 prominent, subparallel terrace lines; adaxial terrace lines end posteriorly in front of genal angle, abaxial lines continue to posterior margin; prominent, continuous row of pores between marginal and supramarginal lines; additional pores widely scattered between other terrace lines; lateral margin with arcuate lateral convexity anterior, flattening and becoming blade-like posteriorly; genal spine retained as very small, sharply pointed triangular projection; doublure with 11-12 very fine subparallel terrace lines, laterally almost lines crowded around relatively long and deep pandarian notch.

Hypostome with sagittal length subequal to maximum width across anterior wings; width across shoulders about 65 percent width across anterior wings; sagittal part of middle furrow set at about 65 percent of distance posteriorly to anterior margin; anterior wings broad and tab-shaped, held nearly vertically; anterior margin rim-like, with distinct submarginal furrow deepest medially; lateral border furrow originating below posteriormost part of anterior wing, incised and deep, widening slightly posteriorly; lateral border narrow, with very strong ventral convexity; border and border furrow deflected strongly laterally to form shoulder, lateral points sharp; lateral border and border furrows converging posteriorly, grading smoothly and without interruption into posterior border and border furrow; posterior border lengthened very slightly medially; middle furrow originating at lateral border furrow opposite anterior end of shoulder, weak and shallow, declined posteromedially at about 45 degrees, extremely shallow to absent medially; maculae small and oval, set immediately behind lateral parts of middle furrow; anterior lobe of middle body with ridge-like striae combined into prominent bicomposite sagittal keel, striae continuing and deflecting laterally both anteriorly and posteriorly to run onto anterior wings and posterior lobe of middle body; keel with moderate, evenly arcuate ventral sagittal convexity (Pl. 1, fig. 7b).

Rostral plate (Pl. 1, fig. 1d) with sagittal length about 35 percent of maximum anterior width; connective sutures long an obliquely set, not quite meeting posteriorly to define subtriangular plate; doublural terrace lines continued without interruption across connective sutures.

Thoracic segments: It was not possible (see below) to distinguish between thoracic material of Gerastos melolliusae and the cooccurring G. fosterae. The sclerites figured with G. melolliusae (Pl. 2, figs. 12-14) are considered to be derived from the posterior part of the thorax, whereas those figured with G. fosterae (Pl. 4, figs. 2-5) are probably anterior segments. All are described together here, and differences between them are presumed to be mainly due to serial variation along the thorax. Anterior segments: anterior and posterior pleural bands similar in length (exssag.); pleural furrow short, incised, of similar length proximally and distally; anterior edge of distal part of pleura with very short (exssag.) striplike articulatory facet set off from anterior pleural band by incised furrow; pleurae deflected posteriorly distal to furculum; with (tr.) of distal pleurae increasing posteriorly; dorsal part of distal pleura developed into slightly concave, petaloid articulating facet; pleurae lacking dorsal tuberculate sculpture; axial furrow shallow, contact of axial and pleural furrows developed as triangular depression; axial ring broad (63-65 percent of width of segment in anterior segments),
short, longer exsagittally than sagittally; axial ring uninflated dorsally, swollen into lobate projection laterally (Pl. 4, figs. 4b, 5b); axial ring with dorsal sculpture of crowded small to moderate sized tubercles; preannular lobe large, about 150 percent sagittal length of axial ring, set off from ring by incised preannular furrow, furrow lengthening slightly exsagittally; articulating furrow very deep and short, much more incised than preannular furrow, of same length sagittally and exsagittally; articulating half ring slightly shorter (sag.) than preannular lobe. Posterior segments as for anterior segments, except for the following: axis relatively narrower (as low as 40 percent width of segment); distal part of pleura much wider, with more lobate tip; lateral swellings on axial ring much more subduced (Pl. 2, figs. 13b, 14b), ring relatively longer (sag., exsag.); preannular lobe smaller, sagittal length subequal or slightly shorter than that of articulating half ring.

Pygidium with sagittal length (including articulating half ring) 60-62 percent maximum width; axis with maximum width 73-76 percent sagittal length (including articulating half ring); axial furrows deflected laterally around first axial ring, then gently posteriorly convergent, forming even subcircular arc to fully define axis posteriorly; first axial ring with very shallow «W» shape along posterior edge, anterior edge very slightly anteriorly concave, dorsal sculpture of scattered small to moderate sized tubercles; very short preannular lobe developed in front of first axial ring, set off by shallow but short and incised preannular furrow; articulating furrow deeper than preannular furrow, but much shorter and shallower than those of posterior thoracic segments; articulating half ring about 85 percent as wide as first axial ring; second axial ring much more prominently «W» shaped than first ring, with lateral pair of exsagittally slot-like apodermal pits, sculpture similar to first ring; posterior rings similar in morphology to second ring, progressively narrower and more effaced; first ring furrow transverse, long (sag., exsag.) and deep; posterior ring furrows progressively shallower; eight axial rings and transverse terminal piece developed; pleural furrows slightly deeper than interpleural furrows; first pleural furrow extended distally across anterior part of border; posterior pleural and interpleural furrows essentially terminated at inner edge of border; at least five sets of furrows developed, becoming very narrow and shallow posteriorly; border broad, occupying all of space between posterior end of axis and margin, with dorsal sculpture of moderate but very subduced tubercles and marginal sculpture of 3-4 supramarginal terrace lines and single small row of perforations; ventral margin drawn down around articulating facet of anterior pygidial segment, transversely straight around rest of pygidium; doublure broad, with many (12+) closely spaced subparallel terrace lines, becoming slightly finer toward inner edge.

Basis of association: Gerastos mellishae occurs together with G. fosterae n. sp. in about equal abundance at both Baille-Hamilton and northwestern Cornwallis islands. Although superficially very similar, several criteria allow considerable confidence in the association of most sclerite types. It does not seem possible in the present state of knowledge to discriminate between thoracic segments, and these are illustrated with one or other of the species in essentially arbitrary fashion. For all other sclerite types, it is always possible to recognize two separate and clearly differentiated morphologies. Association of cephalic sclerites is straightforward, as both species are represented by at least one articulated cephalon. Proper assign-
row that is significantly deeper than the lateral border furrow, versus almost identical in depth; and genal spine reduced to small triangular point versus retained as short spine.

**Material**: Holotype, cephalon, ROM 52769 (Pl. 3, fig. 3a-e), from section BHL 1 92 m, oronyms ROM 52767, 52768, 52770-52790, from section BHL 1 92 m and locality BHI-C (southern Baillie-Hamilton Island) and talus boulder ABR TTD (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian; Cyrtograptus peneri-Monograptus opimus Zone), central Canadian Arctic.

**Etymology**: After Claire Mellish.

**Gerastos fosterae** n. sp.  
Pl. 3, figs. 1-13; Pl. 4, figs. 1-11  
1977 *Proetus* (s.l.) *granulatus* Lindström, 1885 – Perry and Chatterton, p. 289, pl. 1, figs. 9-11, 16-18, 21-23 (non figs. 12-14, 19, 20 = *Gerastos sinus* (Lane, 1984); non fig. 15 = *Gerastos mellsisae* n. sp.)

**Diagnosis**: Glabella with maximum width slightly greater than sagittal length; anterior border furrow deeply incised laterally; eye of moderate size; typically two adjacent, extremely prominent marginal pore rows; librigenal field broad relative to length; librigenal lateral border flared and flattened posterolaterally; pygidium with sagittal length including articulating half ring 58-63 percent maximum width; pygalial axial with maximum width 83-88 percent sagittal length including articulating half ring.

**Description**: Description is accomplished through comparison with the cooccurring *Gerastos mellsisae*, which is fully described above.

Cranidium with librabella wider and shorter, more strongly vaulted in sagittal profile; glabellar tuberculate sculpture slightly more coarse; median occipital node more prominent; anterior section of facial suture shorter; anterior border narrower; cephalic margin with two versus one prominent rows of pores; anterior border furrow much deeper and more incised laterally. Librigena with less elongate field. Hyposome with more subdued middle body striae and less keel-shaped rynchoc. Pygidium much wider relative to sagittal length; axis much shorter, with seven versus eight axial rings.

**Discussion**: *Gerastos fosterae* is most similar among northern Lauretian Wenlock species to the slightly younger *G. milleri* n. sp. Features collectively differentiating this species pair from remaining Cape Phillips Formation congeners were discussed above under *G. mellsisae*. *Gerastos fosterae* differs from *G. milleri* in the possession of considerably smaller eyes (cf. Pl. 3, figs. 1d, 3c, with Pl. 6, figs. 1d, 2e), a concomitantly much broader librigenal field, a more posterolaterally broadened and flattened librigenal lateral border, and pygidia with significantly longer axes (maximum width 83-88 percent sagittal length including articulating half ring versus 95 100 percent in *G. milleri*). The species are otherwise very similar.

**Material**: Holotype, cephalon, ROM 52769 (Pl. 3, fig. 3a-e), from section BHL 1 92 m; paratypes ROM 52767, 52768, 52770-52790, from section BHL 1 92 m and locality BHI-C (southern Baillie-Hamilton Island) and talus boulder ABR TTD (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian; Cyrtograptus peneri-Monograptus opimus Zone), central Canadian Arctic.

**Etymology**: After Tiffany Foster.

**Gerastos sinus** (Lane, 1984)  
Pl. 4, figs. 12-20; Pl. 5, figs. 1-4

1977 *Proetus* (s.l.) *granulatus* Lindström, 1885 – Perry & Chatterton, p. 289, pl. 1, figs. 12-14, 19, 20 (non pl. 1, figs. 9-11, 16-18, 21-23 = *Gerastos fosterae* n. sp.; non pl. 1, fig. 15 = *Gerastos mellsisae* n. sp.)

1984 *Proetus* (s.l.) *sinus* n. sp. 1 Lane, p. 57, pl. 2, figs. 1-7

**Discussion**: The Cape Phillips Formation sample, even allowing for differing preservation, seems identical in all respects to the North Greenland type material. This is not surprising, as there is considerable overlap of species in the Greenland fauna with those of horizon AV 4 126 m and local equivalents (Chatterton and Perry, 1983) in the central Mackenzie Mountains, and with section BHI 1 110 m/BHI 1 0 m in the central Arctic.

In discussing *Gerastos sinus*, Lane (1984, p. 58) questioned whether the «weak submarginal structure» seen on the pygidium represented a true pygidial border, pointing out that it widened backwards (true of *G. sinus*), but the structure actually narrows backwards in some of the Cape Phillips Formation species, and appeared to be interrupted by the axis: «In no other trilobite does a clearly-developed axis overlie an undoubted border.» The silicified material now available reveals that the «weak submarginal structure» does indeed match exactly the ventral extent of the doublure (best seen in *Gerastos milleri*, Pl. 6, fig. 8a, 8b) and should therefore be considered a true border. Although the axis does appear to «interrupt» the border dorsally, it can be seen that the doublure in fact curves tightly around the furrow defining the rear of the axis (Pl. 6, fig. 8b), such that the border is constricted, but lies entirely outside the axis.

**Material**: Assigned specimens ROM 52791-52803, from sections BHL 1 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, Monograptus instre tus-Cyrtograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

**Gerastos monksi** n. sp.  
Pl. 5, figs 5-18

**Diagnosis**: Glabella and anterior border elongate; librigenal field coarsely tuberculate for genus;
genal spine retained as short, tubular structure even in large holaspides; pygidial axis elongate (anterior width 70-72 percent sagittal length including articulate half ring), some specimens with faint ninth axial ring.

Discussion: Gerastos monks is compared with *G. mellishae* above. It differs from the older *G. galei* in the possession of a longer anterior border (cf. Pl. 5, fig. 5a with Pl. 7, fig. 1a); a more anteriorly elongate glabella; finer, denser glabellar tuberculation; denser and more prominent librigenal field tubercles; and a slightly larger genal spine in large holaspides.

Material: Holotype, pygidium, ROM 52815 (Pl. 5, fig. 16a-c); paratypes ROM 52804-52814, 52816, 52817, from talus boulder ABR TTC and section ABR 1, 5.5-13.5 (near Abbott River, northwestern Cornwallis Island) and section BF 2, 3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower to upper Homerian; *Cyrtograptus lundgreni-Monograptus testis* Zone to *Colonograptus? praedeubeli-C. debeli* Zone), central Canadian Arctic.

Etymology: After Neale Monks.

*Gerastos milleri* n. sp.
Pl. 6, figs. 1-15

Diagnosis: Eyes very large for genus; librigenal lateral border with relatively even width and dorsal convexity both anteriorly and posteriorly; pygidium and pygidial axis broad relative to length.

Discussion: *Gerastos milleri* was compared with the closely related *G. fosterae* above. *Gerastos milleri* occurs together with *G. galei*. Criteria for association of exoskeletal parts were discussed above under *G. mellishae*.

Material: Holotype, cephalon, ROM 52819 (Pl. 6, fig. 2a-e); paratypes ROM 52818, 52820-52832, from section ABR 2, 27 m and talus boulders ABR TTC(3) and ABR TTC(5), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus perneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

Etymology: After Giles Miller.

*Gerastos galei* n. sp.
Pl. 7, figs. 1-12

Diagnosis: Occipital ring elongate (sag., exsag.); axial furrows subparallel opposite L1 and L2; abruptly anteriorly convergent in front of S2; librigenal field with small, subdued tuberculate sculpture; genal spine relatively large for species group.

Discussion: *Gerastos galei* was compared with *G. mellishae* and *G. monks* above. It differs from *G. simus* in the possession of a longer occipital ring; straight versus laterally convex posterior axial furrows; finer and less prominent caecal pitting on the librigenal field; and a slightly smaller genal spine.

Material: Holotype, cranidium, ROM 52833 (Pl. 7, fig. 1a-d); paratypes ROM 52834-52844, from section ABR 2, 18 m talus boulders ABR TTC(3) and ABR TTC(5), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus perneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

Etymology: After Andy Gale.

*Gerastos* sp.
Pl. 7, figs. 13, 14

Discussion: Two pygida are distinct from those of the cooccurring *Gerastos milleri* and *G. galei* in the possession of an axis that occupies a much greater area relative the remainder of the pygidium. The specimens both have six axial rings and are wide relative to their sagittal length. They very likely represent a very rare new species related to *G. milleri* and *G. fosterae*, but are further distinguished from those species by their nearly deltiform outline and significantly longer pygidial axis. No other sclerites that could be associated with them were recovered. Given that both of the cooccurring species are more common by at least an order of magnitude, it is not considered likely that any of the sclerites assigned to either *G. milleri* or *G. galei* belong to this very rare third species.

Material: Assigned specimens ROM 52845, 52846, from talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus perneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

Genus *Pseudogerastos* Lütke, 1990

Type species - Proetus vanzengi Foerste, 1923, Wenlock, Arkansas.

Other species - *Pseudogerastos cocksi* n. sp., mid-Sheinwoodian, Arctic Canada; *Proetus (Lacunosporaspis) confossus* Owens, 1973, upper Homerian, England; *Pseudogerastos forseyi* n. sp., upper Sheinwoodian, Arctic Canada; *Pseudogerastos rossi* n. sp., upper Sheinwoodian, Arctic Canada; *Pseudogerastos taylori* n. sp., lower Homerian, Arctic Canada; *Proetus handwerki* Wellner, 1907, Wenlock, Illinois.

Diagnosis: Cephalon with fine and usually subdued tuberculate sculpture; lateral occipital lobes relatively weakly inflated, lateral occipital furrows very shallow; librigenal field broad, with prominent pitting; genal spine always present; thoracic axial rings inflated and strongly vaulted; pygidium with pleural bands and furrows strongly expressed.
5-7 inflated axial rings that are produced postero-medially, and a sharply defined border with prominent subparallel terrace lines.

Discussion: In addition to the type species (see Holloway, 1980), Lütke (1990) included in *Pseudogerastos* the species *Proetus handwerki* and all of the proetid material from the Cape Phillips Formation described by Perry & Chatterton (1977). *Proetus handwerki* is known from an internal mold preserved in coarse dolomite (Lütke, 1990, pl. 3, fig. 21) and is so poorly preserved that interpretation is difficult (Holloway, 1980, p. 12) made comparison with *P. vaningeni* and the species may be related, but more information is required to assess the affinity with confidence. The material figured by Perry & Chatterton is unrelated to *P. vaningeni*, but is assigned herein to *Gerastos simus*, *G. melli-shae*, *G. fosterae*, and *Winiska youngi* (see synonyms). New species from the Cape Phillips Formation, however, appears to be related to *P. vaningeni*, and is certainly related to the British species described by Owens (1973) as *Proetus* (*Lacunoporaspis*) *confossus*. Although *Pseudogerastos* *vaningeni* is not as well known as the remaining species, together they appear to form a clade, and it is to this group to which *Pseudogerastos* is applied herein.

All of the Laurentian species assigned herein to *Pseudogerastos* have a distinctive pygidial morphology, with prominent, rib-like pleural bands, a sharp fulcrum edge, and usually 5-6 axial rings that are drawn posteriorly medially. One of the two pygidia assigned by Perry & Holloway (1980, p. 12) shares this morphology. The other, however, (Owens, 1973, pl. 4, fig. 7) has at least 7 axial rings that are essentially transversely straight, a narrow axis, and the pleural ribs rather subdued. In light of the new Canadian species, it seems questionable whether this latter sclerite belongs to *P. confossus*. The material described by Owens as *Proetus* (*Lacunoporaspis*) *confossus* (Owens, 1973, pl. 4, figs. 9, 10) is a species of *Winiska* very similar to the new Canadian taxa described below. A pygidium assigned by Thomas (1978, pl. 9, fig. 8) to *Proetus concinnus* differs from all others of that species in the possession of pygidial features characteristic of *Pseudogerastos*, to which it may belong.

*Pseudogerastos forteyi* n. sp.

Pl. 8, figs. 1-15; Pl. 9, figs. 1-19; Pl. 10, figs. 1-3

Diagnosis: Anterior sections of facial sutures parentheses-shaped, only slightly anteriorly divergent; posterior librigenal strips set nearly transversely; librigenal field broad, with sculpture of very prominent caecal pits; genital spine long; pygidial border broadest medially, but only slightly flexed.

Description: Cranidium with width across palpbral lobes 91-95 percent sagittal length; width across maximum divergence of anterior sections of facial suture 95 percent width across palpbral lobes; anterior border nearly flat posteriorly, grading into long and shallow border furrow, convex and subcylindrical anteriorly and marginally, with dorsal and marginal sculpture of moderate, subparallel terrace lines; anterior sections of facial sutures laterally convex and parentheses-shaped in front of palpbral lobes and opposite frontal area, pinched strongly adaxially opposite anterior border furrow; broad, subtriangular frontal area with prominent caecal pitting but lacking tuberculate sculpture; palpbral lobes held in horizontal plane, narrow and lacking sculpture but for very faint subcentral pit; posterior sections of facial sutures also laterally convex and parentheses-shaped, but obliquely set so as to be posteriorly convergent, deflected laterally almost normal to exsagittal plane, with slight posterior deflection distal to fulcrum; posterior fixigena reduced to very narrow strip, not extended onto posterolateral projection; posterior border furrow terminated at facial suture only short distance abaxial to origin; posterolateral projection formed almost entirely of short (exsag.) posterior border with subcylindриcal dorsal convexity and lacking dorsal sculpture; axial furrows obscured between tall and steep-sided fixigena and glabella, grading without interruption into palpcbral furrow; preglabellar furrow nearly straight, but slightly anteriorly convex medially; glabella broadest across midlength of L 1, maximum width subequale to sagittal length; S 1 in contact with axial furrow, running postero-medially, forked adaxially, proximal part of anterior forke isolated or nearly isolated (e.g., Pl. 8, fig. 10a, left side), posterior fork narrow, always contiguous with distal part, running more strongly postero-medially but stopping short of S 0; L 1 protruded laterally from outline of glabella, with weak independent inflation; S 1 also originating at axial furrow, running postero-medially with subparallel course to distal part of S 1, terminated slightly adaxially to fork in S 1; L 2 about half the length of L 1 (exsag.), with very slight independent inflation; S 3 narrow (tr.), isolated from axial furrow, set just posterior to maximum point of divergence of anterior sections of facial sutures; S 4 present as small, very slightly transverse pit set immediately in front of S 3; dorsal glabellar sculpture of very fine, subdued, granulose tubercles; S 0 deep, overhung laterally by expanded rear of L 1; L 0 elongate, shelf-like, with weak dorsal convexity; median occipital node small, set slightly posterior to sagittal midlength of L 0; lateral occipital lobes weakly inflated, furrow present near contact with S 0 but effaced posteriorly.

Librigenal field with minimal width about one third exsagittal length; field with prominent caecal pitting; very fine tuberculate sculpture present in small individuals (e.g., Pl. 8, fig. 13), but entirely absent from larger specimens; eye socket of narrow, somewhat irregular band; subocular area narrow, similar in width to socle, very faint subocular ridge developed anteriorly in some specimens (Pl. 8, fig. 12; Pl. 9, fig. 2b); posterior border furrow incised, considerably deeper and shorter (exsag.) than lateral border furrow is wide (tr.); posterior and lateral border furrows uniting in front of genal angle to run distally along dorsal aspect of genal spine, becoming much more narrow distally; posterior border with strong dorsal convexity, lacking dorsal sculpture; lateral border with strongest convexity along border furrow, sculpture of 7-8 close set,
subparallel terrace lines; genal spine subequal in length (exsag.) to field, tapering distally to relatively sharp point; doublure broad, flat, with sculpture of 13-15 subparallel terrace lines, slightly coarser and more widely spaced near inner edge of doublure.

Rostral plate not found.

Hyposome with maximum width across anterior wings about 83 percent sagittal length; anterior margin arcuate and strongly downturned (PL 8, fig. 14a); anterior wings large and tab-shaped, held slightly oblique to exsagittal plane; lateral border furrows deep, originating at posterior end of anterior wings, deflected laterally at moderately developed shoulder, running without change in size or depth into posterior border furrow; posterior border furrow with gentle and even posterior convexity; lateral and posterior border contiguous, narrow, with ventral sculpture of one or two terrace lines; middle furrow and maculae very subdued; middle body with relatively even ventral sagittal convexity, except for deflection around anteriorly set rhynchos; middle body sculpture of laterally deflected, ventral sagittal facet; pleural tip expanded and doublure.

Narrow, convexity, except for middle body with relatively bowed striae, uniting anteriorly to set rhynchos; middle body sculpture of laterally deflected facet; pleural tip expanded and doublure.

Thoracic segments with axis occupying 43-48 percent of overall width; fulcrum set at approximately half distance across pleura; anterior and posterior pleural bands subequal in length (sag., exsag.), nearly flat-topped and entirely lacking dorsal sculpture; pleural furrow very short (exsag.) and incised, terminating distally about half distance across distal part of pleura, behind articulating facet; pleural tip expanded and lobate, with small posteriorly directed spine; anterior edge of pleura with small strip of articulatory tongue, separated from anterior band by shallow transverse furrow; axial furrow shallow, set slightly obliquely to exsagittal plane; axial ring longest laterally, about same length sagittally as combined axial furrow shallow, set slightly obliquely to exsagittal plane; articulating half ring; axial ring inflated, with vaulted appearance in transverse view (PL 9, figs. 7b, 10b), with small, swollen median lobe set near posterior margin, in some specimens protruding posteriorly from margin (PL 9, fig. 10a); preannular lobe moderately inflated, short (sag., exsag.), preannular furrow quite long and relatively shallow, incised in some specimens (e.g., PL 9, fig. 6a); articulating furrow sharply incised, deeper than preannular furrow; articulating half ring relatively long and robust, about same length sagittally and exsagittally.

Pygidium with sagittal length (including articulating half ring) about 61 percent maximum width; articulating half ring with slight dorsal convexity, longest sagittally, tapering rapidly exsagittally; very short preannular lobe set off from articulating half ring anteriorly and first axial ring posteriorly by articulating furrow and preannular furrow of similar depth; axial furrows strongly and evenly posteriorly convergent, shallowly slightly around rear of axis; axis with maximum width across first ring 86-89 percent sagittal length (including articulating half ring); six fully developed axial rings (sometimes very faint seventh), with transverse terminal piece; axial rings inflated and vaulted, with median node typically drawn posteriorly; faint apodemal pit developed laterally on first ring, much deeper, slot-like pits on posterior rings; anterior and posterior pleural bands strongly and equally inflated; pleural and interpleural furrows deeply incised, pleural furrows slightly deeper; bands and furrows of first six segments expressed, becoming only slightly subdual posteriorly; furrows terminating sharply at border; border with abrupt adaxial edge, moderate marginal convexity, narrow anteriorly, widening posteriorly, with sculpture of 6-7 subparallel terrace lines, in some specimens with very slight median flexure (PL 9, figs. 16a, 19c), entirely transversely straight in most (PL 9, figs. 17b, 18b); doublure narrow and strongly upturned against steeply sloping sides of pygidium (PL 9, fig. 19b), with sculpture of subparallel lines similar to that of border.

Discussion: Pseudogerastos forteyi is most similar among described species to the slightly younger \textit{P. rossi} n. sp., from which it differs in the possession of generally finer glabellar sculpture in large specimens; a slightly more inflated glabella (compare especially in sagittal profile); less anteriorly divergent anterior sections of the facial sutures; a slightly shorter anterior border with deeper border furrow; much less posteriorly deflected distal parts of the posterior sections of the facial sutures (cf. PL 8, figs. 3a, 4a, with PL 11, figs. 5a, 6a); generally significantly longer genal spine with tapering versus blunt tip; broader and more prominently pitted librigenal field; pygidial axial rings universally with small, independently inflated median node on first four rings versus variably developed but commonly restricted to anterior rings (PL 12, figs. 8a, 10a) or entirely absent (PL 10, fig. 5a); and pygidial posterior margin that is nearly transversely straight (PL 9, figs. 16a, 17b, 18b) versus distinctly and pervasively flexed (PL 12, figs. 5b, 6b, 7b, 8c, 9c, 10b).

\textit{Pseudogerastos forteyi} is distinguished from \textit{P. confossus} (Owens, 1973) in the possession of a less anteriorly tapering and considerably more inflated glabella; finer dorsal terrace lines on the anterior border; posteriorly convergent versus subparallel posterior sections of the facial sutures opposite \textit{L1} and the lateral occipital lobes; and much shorter genal spines. \textit{Pseudogerastos forteyi} differs from the type species, \textit{P. vanhengeni}, in its considerably shorter anterior border; sagittally more elongate occipital ring; much broader \textit{L1}; and pygidia with less pronounced articulatory boss at fulcrum and much more deeply impressed pleural and interpleural furrows. \textit{Pseudogerastos forteyi} is compared with \textit{P. cocksi} and \textit{P. taylori} below.

Material: Holotype, cranidium, ROM 52853 (PL 8, fig. 7a-d), from talus boulder ABR TTD; paratypes ROM 52847-52852, 52854-52883, from talus boulder ABR TTD (northwestern Cornwallis Island), sections BHL 1 92 m and BHL 1 204 m, and locality BHH-C (all southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, \textit{Cyrtogaptus perneri-Monograptus opinus Zone}), central Canadian Arctic.

Etymology: After Richard Fortey.
**Pseudogerastos cocksi** n. sp.
Pl. 10, figs. 4-15

1977 *P. fortiei* sp. Porty & Chotterton, p. 290, pl. 1, figs. 1-2 (near pl. 1 figs. 3-8 = *Winiskia youngii* n. sp.)

**Diagnosis:** Tuberculate sculpture on glabella and librigenal field prominent for genus; genal spine of moderate length, with very pronounced taper to sharp tip; thoracic axial ring with only moderate transverse inflation; pygidium with seven axial rings, seven sets of axial ridge; posterior pygidial rings, seven sets of axial ridge; posterior pygidial pleural bands significantly more inflated than anterior bands.

**Discussion:** *Pseudogerastos cocksi* n. sp. is the oldest known member of the genus, and possibly displays the most primitive morphology. It differs from the younger *P. fortiei* in its stronger cranidial tuberculate sculpture; longer anterior border; more prominent median occipital node; moderate versus absent tuberculate sculpture on the holaspis librigenal field; much less prominent furrow on the dorsal aspect of the genal spine; less vaulted thoracic segments; pygidium with typically seven versus typically six fully expressed axial rings; posterior pygidial pleural bands with distal inflation greater than that of anterior bands; and pygidial border that is relatively narrower medially, and only slightly broader sagittally versus exogastrally. These contrasts apply also to *P. rossi*, with the additional differences of less anteriorly divergent anterior sections of the facial sutures; longer genal spine, and pygidium with no median flexure.

**Material:** Holotype, pygidium, ROM 52892 (pl. 10, fig. 12a-c), from section BHL 1 0 m; paratypes ROM 52884-52891, 52893-52895, from sections BHL 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus insumus-Cyrtograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

**Etymology:** After Robin Cocks.

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**Pseudogerastos rossi** n. sp.
Pl. 11, figs. 1-16; Pl. 12, figs. 1-12

**Diagnosis:** Anterior sections of facial sutures prominently anteriorly divergent; anterior border moderately long; posterior sections of facial sutures with posterior deflection distal to fulcrum; librigenal field relatively narrow, with subdued pitting; genal spine quite short, with blunt tip; pygidium with median axial nodes subduced or absent, posterior margin with distinct median flexure.

**Discussion:** *Pseudogerastos rossi* is compared with *P. fortiei* and *P. cocksi* above.

**Material:** Holotype, cranidium, ROM 52898 (pl. 11, fig. 3a-b), from section ABR 2 27 m; paratypes ROM 52896, 52897, 52899-52923, from section ABR 2 27 m and talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus perneri-Monograptus optimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

**Etymology:** After Andrew Ross.

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**Pseudogerastos taylori** n. sp.
Pl. 12, figs. 13-19; Pl. 13, figs. 1-9

**Diagnosis:** Glabella very inflated, overhanging anterior border; anterior short; librigenal pitting very fine and subduced; genal spine reduced to fine point in holaspis; pygidial pleurae reduced, pygidial narrow and vaulted; pygidial axial rings elongate, all but first ring furrow very shallow; pygidial margin dorsally upturned and rim-like.

**Description:** Description is accomplished through extended comparison with *Pseudogerastos fortiei*, which is given full written description above.

Cranidium with glabella more inflated and sagittally vaulted; glabellar lateral margins subparallel versus anteriorly convergent; L1 slightly smaller; S1 less deeply impressed; S2 isolated from, versus in contact with, axial furrow; glabellar sculpture of considerably coarser tubercles; anterior sections of facial sutures anteriorly convergent versus divergent; frontal area narrower; anterior border slightly shorter.

Librigena with nearly rounded genal angle versus elongate genal spine; eye socket narrower; field narrower, with much finer and more subduced calcal pitting and fine, dense tubercles; lateral border relatively broader.

Pygidium narrower; axis occupying much more of overall area; axis strongly arched in sagittal profile; posterior axial rings subduced and nearly effaced, versus strongly expressed; fulcral angle much stronger; margin upturned and rimlike, with only slight median expansion and lacking median flexure.

**Discussion:** Despite its quite derived morphology, *Pseudogerastos taylori* displays all of the generic apomorphies. The species is differentiated from all congeners in its extremely inflated, vaulted glabella that is extended forward to overhang the anterior border; completely absent holaspis genal spine; and narrow, strongly vaulted pygidium with an upturned, rim-like border.

**Material:** Holotype, cranidium, ROM 52931 (pl. 13, fig. 1a-e), from section ABR 1 5.5 m; paratypes ROM 52924-52930, 52932-52939, from sections ABR 1 5.5-9 m (near Abbott River, northwestern Cornwallis Island) and BH 2 2-3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Homerian, *Cyrtograptus budgeni-Monograptus testis* Zone), central Canadian Arctic.

**Etymology:** After Paul Taylor.

**Genus Hedstroemia** Průšy and Vaněk, 1978

**Synonyms:** *Miles-avis* Lieberman, 1994; *Pachyrotoerus* Linke, 1990.
Type species - Proetus delicatus Hedström, 1923, Wenlock, Sweden.


Discussion: Lütke (1990, p. 50, fig. 1) erected the monotypic subgenus Pachyproetus, indicating its derivation from an expressly paraplyphic Hedstroemia, and suggesting it might be related to the Devonian dechenelines. Hedstroemia pachydermata differs from its congeners mainly in details of relative proportion. Its recognition as a monotypic taxon creates pointless paraphyly in Hedstroemia, of which Pachyproetus is considered a subjective junior synonym herein.

Lieberman (1994) introduced the species eldredgei for two pygidia from the upper Homerian Much Wenlock Limestone figured by Owens (1973, pl 15, figs. 16, 17) under open nomenclature. The pygidia are obvious representatives of Hedstroemia, a fact seemingly acknowledged by Lieberman (1994, p. 137), who distinguished them from those of the type species only by the presence of an additional axial ring. Nevertheless, Lieberman made eldredgei the type of a new genus, Milesdavis, in which he also included Dechenella (Monodechenella) zicho-viana Příbyl, 1966, a taxon known from a single pygidium. Snážr (1980) considered this species a nomen dubium, with the opinion that Příbyl’s (1966) locality information was incorrect, that the matrix of the specimen was incompatible with the stated provenance, and that the specimen was probably Carboniferous in age, and doubtfully derived from the Czech Republic. Hence, Milesdavis is a genus based on three illustrated pygidia, two of which are nearly identical with the Silurian type species of Hedstroemia and one of which is of essentially unknown, but probably Carboniferous, provenance. In addition, Lieberman considered his new genus expressly paraphyletic, based on an attempt (Lieberman, 1994, fig. 36) at phylogenetic analysis incorporating the pygidia assigned to Milesdavis, but omitting all of the known species of Hedstroemia except for H. pachydermata. Disregarding the fact that neither of the species assigned to Milesdavis is remotely well enough known to assess adequately (beyond the fact that eldredgei is obviously ingroup Hedstroemia), Lieberman’s cladistic exercise could not test the monophyly or inclusivity of Hedstroemia, as the genus was treated as essentially monotypic. Milesdavis is placed in subjective junior synonymy of Hedstroemia herein.

Lütke (1990) assigned Proetus channahonensis Wellerr, 1907, to his new Thebanaspis. This species (Lütke, 1990, pl. 10, figs. 67-72) certainly resembles the type species of Thebanaspis, T. thebana. Lütke, 1990, in cranial proportions and possession of a broad, deltiform pygidium. However, unlike T. thebana, which seems to be related to the new Wenlock species described under Thebanaspis below, P. channahonensis possesses certain features that indicate it may represent the oldest known and most plesiomorphic representative of the Hedstroemia clade. Both advanced Thebanaspis and Hedstroemia have L1 and the lateral occipital lobe independently inflated and nearly isolated, a feature shared with P. channahonensis. The latter species, however, has a glabella with a subpentagonal outline very similar to that of Hedstroemia, as well as a weak epiborder furrow. Most strikingly, it also has a pygidium in which the distal parts of the anterior pleural bands are swollen and lobate (Lütke, 1990, pl. 10, figs. 71, 72), one of the most prominent apomorphies of Hedstroemia. The possibility of relationship can only be confirmed by the discovery of more Llandovery and lower Wenlock species, but P. channahonensis is assigned with question to Hedstroemia herein.

In addition to the species listed above, Lütke (1990) included Proetus engelius Northrop, 1939, known from two pygidia, noting the strong similarities with Crassiproetus and using this as evidence of a potential phyletic link between the genera. This species needs much more documentation before it can be properly assessed. It is excluded from Hedstroemia herein, but further work may establish that it is in fact a derived example of the genus.

Hedstroemia charlotteae n. sp.
Pl. 14, figs. 1-15; Pl. 15, figs. 1-17

Diagnosis: Anterior sections of facial sutures strongly anteriorly divergent; anterior border elongate; dorsal glabellar sculpture of moderate sized, but very subdued, tubercles; librigenal lateral border broad, with broad, shallow epiborder furrow; genal spine long; pygidium with 9-10 axial rings and slightly transverse posteromedian margin.

Description: Cranidium with maximum width across maximum point of divergence of anterior sections of facial sutures 89-102 percent sagittal length; anterior width subequal to width across maximum divergence of posterior sections of sutures, slightly greater than width across midlength (exsag.) of palpebral lobes; anterior sections of facial sutures with strong anterior divergence in front of palpebral lobes, stronger still opposite anterior border; preglabellar field absent; anterior border furrow with inverted V shape, short (sag., exsag.) and relatively shallow; anterior border long (sagittal length 65-70 percent sagittal length of occipital ring), longer exsagittally than sagittally (sagittal length 65-70 percent maximum exsagittal length); epiborder furrow long and shallow, separating short, convex roll in front of anterior border furrow from more elongate epiborder with moderate marginal convexity; epiborder with dorsal and
lobe
posterior sections of facial sutures with projection; glabella with far as anterior border, lacking dorsal marginal convexity opposite ear of Ll and part of Sl, proximal part turned ting large but very subdued tubercles; 1.1 with moderate from main gate proximally, furrow, narrow isolated as nearly posteriorly, shallowing rapidly and not in tal lobes, deflected laterally along shape; dorsal sculpture of crowded, moderately specimens expanded proximally into sely, in some specimens reduced to subdued pit faint pit (PI. 14, fig. 7a); S4 present dorsally as extremely faint and narrow transverse furrow set in front of and more distally than S3 (PI. 14, figs. 2c, 3b), often indiscernible (PI. 14, fig. 1b); axial furrows deflected around L1, moderately anteriorly convergent in front of L1, contacting preglabellar furrow at relatively sharp angle; preglabellar furrow with anterior convexity, but general inverted V-shape; S0 running obliquely behind L1, then nearly transverse (PI. 14, figs. 7a, 8a) or anteriorly convex (PI. 14, fig. 2a) medially; preglabellar, axial, and occipital furrows of approximately equal depth and incision; lateral occipital lobes with strong independent inflation, completely isolated from median part of L0 by furrow comparable in depth to distal part of S0; L0 very elongate (sag., exsag.), longest sagittally, nearly flat and dorsally shelf-like, with dorsal sculpture of crowded terraces of terrace lines set closely opposite ear of Ll, moderately anteriorly, dorsal sculpture; preannular lobe well defined but articulating furrow incised, slightly deeper than preannular furrow; articulating half ring about same length sagittally as axial ring.

Lobigenal field with minimum width (th.) 28-29 percent maximum exsagittal length; eye long and large; eye socle of a single, contiguous, very narrow band, with slight lobate expansion anteriorly; subocular area ranging from ill-defined (PI. 15, fig. 6) to prominent and bounded by definite subocular ridge (PI. 14, fig. 10; PI. 15, figs. 5, 7); field with prominent, coarse caecal pitting, tuberculate sculpture absent; faint genital trunk visible in some specimens, running from posterior part of eye across field toward genital angle (PI. 15, figs. 2, 3a); posterior border furrow deep and incised, becoming shallower and longer (exsag.) laterally; posterior border elongate, becoming longer distally, with only moderate dorsal convexity and lacking tuberculate sculpture, extended posteriorly along adaxial edge of genital spine, where faint terrace lines subparallel with adaxial margin may be developed (PI. 15, fig. 6); lateral border shallow and narrow, subparallel to lateral margin anteriorly, curving adaxially posteriorly, contacting posterior border furrow in most specimens, but shallowed anterior to contact in some (PI. 15, fig. 2); epiborder furrow broad and shallow; roll border furrow and epiborder expanding posteriorly to fill middle area of genal angle; epiborder furrow and posterior border furrow uniting posteriorly to run along large, triangular genal spine (epiborder furrow shallowed anterior of contact in some specimens: PI. 15, figs. 4, 6); epiborder broad and dorsally convex, extended without interruption along abaxial edge of genal spine, uniting with posterior border to form tip of spine; prominent sculpture of raised, subparallel terrace lines along length; doublure very broad, with terrace lines set closely anteriorly, adaxial lines becoming more rugose and curving adaxially around genal angle (PI. 14, fig. 11); pandarian opening small, set directly around postrostral corner of field.

Rostral plate unknown. Hypostome with width across shoulders about 78 percent maximum width across anterior wings; width across anterior wings subequal to sagittal length; anterior wing margin with even anterior convexity, very slight ventral rim set off from middle body by shallow submarginal furrow; anterior wings tab-shaped, wide and relatively short (exsag.), with small lateral anterior process; lateral border furrows moderately posteriorly convergent in front of shoulder, interrupted at shoulder by faint ridge running obliquely from lateral border, lateral furrow appearing to run into middle furrow; posterior part of lateral furrow widened immediately posterior to shoulder, then describing even, convex arc posteriorly with contiguous posterior border furrow; lateral border narrow anteriorly behind anterior wing, widening near shoulder, swollen slightly at point of shoulder, then narrowing again posteriorly, with ventral sculpture of one, two, or three sinuous terrace lines; middle furrow weakly impressed, deepest abaxially; maculae small, describing obliquely set elongate ellipse; posterior lobe of middle body crescentic, essentially lacking ventral sculpture; anterior lobe of middle body narrow, with vertex lines of terrace lines curving more proximally to form chevron shape; middle body with even sagittal ventral convexity, no independently swollen rhynches developed.

Thoracic segment with wide axis (about 55 percent of overall width); pleura short, anterior and posterior bands about equal in length; pleural furrow weakly expressed adaxially, deepest across fulcrum, shallowing above articulating facet; facet fully circumscribed posteriorly by small ridge (PI. 14, fig. 12); pleural tip rounded, with short posterolaterally set spine; axial furrow very shallow; axial ring vaulted in transverse profile, weakly inflated, with only moderate dorsal convexity; ring slightly longer exsagittally than sagittally, lacking dorsal sculpture; preannular lobe well defined but short; articulating furrow incised, slightly deeper than preannular furrow; articulating half ring about same length sagittally as axial ring.

Pygidium with sagittal length (including articulating half ring) 63-66 percent maximum width; axis with maximum width 77-80 percent sagittal length; articulating half ring short, not markedly longer sagittally than exsagittally; preannular lobe on first ring subduced and sliver-like, articulating
furrow transverse, very short, precanalicular furrow shallow and posteriorly convex; first axial ring strongly turned posteroomedially, with short, postero-dorsally directed median spine; nine or ten axial rings; rings posterior to first ring with deep lateral muscle pit and dorsal sculpture of muted tubercles; axial furrows shallow, deeper posteriorly, laterally concave opposite first five rings, laterally convex posteriorly, terminating in front of faint postaxial ridge; pleural and interpleural furrows incised, defined on first five segments, pleural furrows deeper than interpleural furrows; anterior and posterior pleural bands of similar length (exsag.) proximally, anterior band swollen and lobate distally; anterior band of first segment greatly expanded into broad articulating facet; faint border furrow marking inner extent of doublure, running across anterior pleural bands at adaxial bound of distally swollen part, forming faint depression on posterior bands; pleural bands and furrows terminated at wide but shallow epiborder furrow; prominent marginally convex epiborder with sculpture of fine, subparallel terrace lines, expanded slightly medially; doublure broad (Pl. 15, fig. 10c), with many subparallel lines, becoming smaller and more closely spaced near inner margin.

Discussion: Hedstroemia charlotteae n. sp. is most similar among known taxa to the type species, H. delicata (Hedström, 1923), although the latter has yet to be photographically illustrated. Hedstroemia charlotteae is distinguished from H. delicata in the possession of a significantly longer anterior border; exsagittally shorter S1; much better defined lateral occipital lobes; broader librigenal lateral border and wider, longer genal spine; hypostome apparently with relatively broader shoulders; and a pygidium that is broader relative to its length, with 9-10 versus 11 fully defined axial rings. Hedstroemia charlotteae differs from H. kutchi Ludvigsen & Tripp in its much more anteriorly divergent anterior sections of the facial suture; much longer anterior border; better impressed glabellar furrows; more prominent dorsal tuberculate sculpture; hypostome with lateral border furrows posteriorly convergent versus subparallel in front of shoulder (cf. Pl. 14, figs. 13-15 with Ludvigsen & Tripp, 1990, pl. 6, figs. 13, 14); more prominent caecal pits on librigenal field; wider librigenal lateral border with much shallower epiborder furrow; narrower eye socle; elongate versus absent genal spine; pygidium with the axial rings less effaced, anterior pleural bands more swollen, median node on first axial ring developed as short spine versus subduted and lobate, and posterior margin more postero-medially transverse, versus subcircular. Hedstroemia soandonghi Ludvigsen & Tripp is less well known, but differs from H. charlotteae in its shorter anterior border, much more pronounced dorsal cranial and pygidial tuberculate sculpture, and pygidium with relatively smaller pleural area. Hedstroemia charlotteae is comparable to H. pachydermata (Barret, 1878) (see Lütke, 1990) in cranial morphology, including the length of the anterior border, the divergence of the anterior sections of the facial sutures, and approximately equivalent glabellar tuberculation, but differs in its wider hypostomial shoulders and pygidium with 9-10 versus approximately 14 axial rings and much narrower border. Hedstroemia charlotteae is compared with H. weedoni below. Fragmentary material from the Mackenzie Mountains described as ?Szechzoproetus sp. by Perry & Chatterson (1979) is very similar to H. charlotteae, but differs in the possession of a swollen median spine on both the first and second axial rings, versus only the first.

The available sample of this species is quite large, and several malformed sclerites have been recovered. One librigena (Pl. 15, fig. 9) has only a small, rounded genal spine and disrupted posterior and lateral borders. A second (Pl. 15, fig. 8) has a very short genal spine, with a seemingly adventitious club-like growth adaxially on the rear of the posterior border. Finally, a pygidium (Pl. 15, fig. 16) has the anterior part of the right pleura disrupted, with bands and furrows growing at an angle to and abutting more posteriorly placed segments. All are possible examples of healed injuries.

Material: Holotype, cranidium, ROM 52941 (Pl. 14, fig. 2a-d); paratypes ROM 52940, 52942-52971, from section ABR 1 22 m, Cape Phillips Formation, Wenlock (upper Homrian, Colomograptus? ludensis Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

Etymology: After Charlotte Jeffery.

Hedstroemia weedoni n. sp.

Discussion: Hedstroemia weedoni n. sp. compares closely with H. charlotteae, but there are several pervasive differences. Though not as well known, the available information seems to warrant formal naming. Hedstroemia weedoni differs from H. charlotteae in its significantly broader librigenal field, narrower librigenal lateral border and doublure relatively narrow, genal spine elongate; nine pygidial axial rings with very elongate median node on first.

Material: Holotype, pygidium, ROM 52982 (Pl. 16, fig. 11a-c), from section ABR 3 24+ m; paratypes ROM 52972-52981, from section ABR 3 24+ m, Cape Phillips Formation, Wenlock (probably upper Homrian, Colomograptus? ludensis Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

Etymology: After Mike Weedon.

Hedstroemia n. sp. A

Discussion: There is not enough material from either horizon to be absolutely certain that lower
Ludlow material from BH 2 42 m on Baillie-Hamilton Island and ABR 1 30 m on Cornwallis Island are conspecific. However, most well-known species are shared between the horizons (e.g., Kettenaspis caldwelli Adrain & Ramsköld, 1997; Boreotangites reedi Adrain, 1994) and such information as is available shows no obvious differences between the samples. All of the material is therefore treated as a single taxon. The species is differentiated from the upper Homarian Cape Phillips Formation species by its much more prominent, finer, and denser granulose sculpture on the dorsal surface of all sclerites. It further displays a much shorter genal spine than either Hedstroemia charlottae or H. weedoni (Pl. 16, figs. 13, 14, 17). A pygidium from ABR 1 30 m (Pl. 16, fig. 18) displays an elongate first axial node similar in dimensions to that of H. weedoni. This feature is not preserved on either of the Baillie-Hamilton specimens (Pl. 16, figs. 15, 16), but the pygidal border preserved on one (Pl. 16, fig. 15b) is medially inflated, unlike the essentially even form seen in H. charlottae (Pl. 15, figs. 10a, 11b) or H. weedoni (Pl. 16, fig. 11c).

Material: Assigned specimens ROM 52983-52989, from sections BH 2 42 m (southern Baillie-Hamilton Island) and ABR 1 30 m (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Ludlow (lower Gorstian, Lobograptus progenitor Zone), central Canadian Arctic.

Genus Thebanaspis Lütke, 1990

Type species - Thebanaspis thebana Lütke, 1990, from the lower Llandovery of Illinois.

Other species - Thebanaspis jefferyi n. sp., lower Homarian, Arctic Canada; T. morrisi n. sp., upper Sheinwoodian, Arctic Canada; Cyphoproetus putzeri Snajdr, 1976, lower Homarian, Czech Republic; T. rutai n. sp., mid-Sheinwoodian, Arctic Canada; C. semindopressus Snajdr, 1975, Telychian, Czech Republic; T. snajdi n. sp., lower Homarian, Arctic Canada; C. strathsmy Owens, 1973, lower Homarian, England; T. toddi n. sp., upper Sheinwoodian, Arctic Canada; T. welshi n. sp., upper Homarian, Arctic Canada; Cyphoproetus sp. of Norford (1981), Telychian or lower Sheinwoodian, northern Ontario.

Diagnosis: L1 and lateral occipital lobes usually strongly inflated and fully isolated; cephalic border furrows very broad; eye sac of single very narrow band, with slight anterior inflation; pygidium deltiform, with ventrally sinuous margin.

Discussion: Although most of the new Wenlock species assigned herein have much more vaulted cranidia and relatively smaller pygidia than the lower Llandovery type species, T. jefferyi n. sp. is strikingly similar to T. thebana, differing mainly in the possession of more incised glabellar furrows. Despite the range of morphologies developed in the Wenlock species, all share the basic apomorphies, particularly the deltiform pygidium with margin sinuous in lateral and posterior view. The interspecific variation is such that one suspects a much more diverse group is being sampled, but in the present state of knowledge it would appear that Thebanaspis as defined herein is monophyletic. The description of T. jefferyi allows reassignment of several very similar and seemingly related species from the Czech Republic and England that has been described originally as Cyphoproetus.

Lütke (1990) allied Thebanaspis with Astroproetus Begg, 1939. Lieberman (1994), however, suggested a possible relationship with Hedstroemia. One of the species assigned to Thebanaspis by Lütke, T. channahonensis, is herein tentatively reassigned to Hedstroemia (see above). If the features shared by this species and Wenlock-Pridoli Hedstroemia are truly synapomorphic, this is compelling evidence for a sister-group relationship between Thebanaspis and Hedstroemia, given the broad overall (presumably plesiomorphic) similarity between H.? channahonensis and T. thebana.

Thebanaspis morrisi n. sp.

Pl. 17, figs. 1-11

Diagnosis: Glabella elongate and subtrapezoidal; glabellar sculpture of dense, moderately sized tubercles; librigenal field with prominent caecal pits and moderate but subtly subduced tuberculate sculpture; pygidal axis narrow, with 9-10 fully defined rings; pygidium with nearly triangular outline.

Discussion: Thebanaspis morrisi n. sp., is very similar to the slightly younger T. toddi n. sp., and the older T. rutai n. sp. Thebanaspis morrisi differs from T. toddi in the possession of a more elongate glabella with a slightly more anterior arcuate preglabellar furrow; more pronounced librigenal field sculpture; and a pygidium with a narrower axis, 9-10 versus 8 axial rings, and a narrower, more posteriorly angled, posteromedian margin. Thebanaspis morrisi differs from T. rutai in the possession of a slightly less inflated, less rounded glabella with more prominent sculpture; deeper S1; a slightly broader librigenal field with more prominent caecal pitting; a more robust and slightly longer genal spine; and particularly a narrower pygidium with 9-10 versus 8 axial rings and the pleural regions much less posteriorly effaced.

Thebanaspis morrisi is compared with other new species below. The species cooccurs with Thebanaspis sp. 1 (see below), a taxon known from a single well preserved cranidium. Reference to the closely related T. toddi allows considerable confidence in the association of sclerites of T. morrisi, and it is not likely that any of those assigned belong in fact to the rare species, which is distinguished particularly by its nearly scrobiculare glabellar sculpture.

Material: Holotype, cranidium, ROM 52990 (Pl. 17, fig. 1a-c), from locality BHH-C; paratypes ROM 52991-53000, from section BHL 1 81-92 m and localities BHH-A and BHH-C, Cape Phillips
Arctic Formation, Wenlock (upper Sheinwoodian, Cyrtograptus perneri-Monograptus opimus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

**Etymology:** After Noel Morris.

*Thebanuspis toddi* n. sp.  
Pl. 17, figs. 12-18

**Diagnosis:** Glabella subrectangular; preglabellar furrow transversely nearly straight; dorsal glabellar sculpture of moderate sized but subdued tubercles; cephalic border furrows relatively narrow; librigenal field with very subdued sculpture; pygidial axis broad and short, with 8 axial rings; posteromedian pygidial margin broad and rounded.

**Discussion:** *Thebanuspis toddi* n. sp. is compared with *T. morrisi* above, and is distinguished from *T. rutai* by its much more transversely straight preglabellar furrow; more rounded glabella; slightly coarser glabellar sculpture; less prominent tuberculate sculpture on the librigenal field; somewhat more parallel-sided pygidial axis; and more subtrigonal pygidium, with a broad and rounded, versus pointed, posteromedian part. *Thebanuspis toddi* differs from *T. smithi* in its much less vaulted cranidium; much more subdued tuberculate sculpture; much smaller median occipital node; much narrower cephalic border furrow; narrower librigenal field; pygidial furrows less incised, particularly posteriorly; eight versus seven pygidial axial rings; absent versus prominent dorsal tuberculation on the axial rings; much less impressed pygidial border; and rounded versus much more pointed posteromedian pygidial margin.

**Material:** Holotype, cranidium, ROM 53001 (Pl. 17, fig. 12a-e), from talus boulder ABR TTC(3); paratypes ROM 53002-53007, from talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian, Cyrtograptus perneri-Monograptus opimus Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

**Etymology:** After Jon Todd.

*Thebanuspis rutai* n. sp.  
Pl. 18, figs. 1-8

**Diagnosis:** Glabella anteriorly rounded, weakly to moderately inflated; glabellar sculpture of fine tubercles; S1 with deeply incised part restricted in length; pygidium moderately broad, both axis and pleura posteriorly effaced, with 3 axial rings, last ring nearly effaced.

**Discussion:** *Thebanuspis rutai* n. sp. is compared above with *T. morrisi* and *T. toddi*, to which it is most similar.

**Material:** Holotype, cranidium, ROM 53008 (Pl. 18, fig. 1a-d), from section BH 1 110 m; paratypes ROM 53009-53015, from sections BH 1 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, Monograptus instrenuus-Cyrtograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

**Etymology:** After Marcella Ruta.

*Thebanuspis welshii* n. sp.  
Pl. 18, figs. 9-16

**Diagnosis:** Anterior border furrow extremely shallow, anterior border nearly grading into preglabellar field; pygidium subcircular in outline, with very subdued transverse sinuosity.

**Discussion:** *Thebanuspis welshii* is the youngest well-known member of the genus and probably the most derived. Particularly striking are the essential loss of the anterior border furrow and greatly reduced pygidial sinuosity. Nevertheless, the overall cephalic morphology agrees so closely with such earlier taxa as *T. morrisi* and *T. rutai* that the species seems very likely to be related. There is strong superficial similarity with warburgellines such as *Teinita*, *Teinita spibo* (Thomas in Thomas & Narbonne, 1979), for example, has nearly identical glabellar lobation and a broadly similar pygidium with the same number of axial rings (nine). Warburgellines without exception, however, possess a prominent transverse swelling on their preglabellar field, associated with their specialized, anteriorly extended hypostome. Such a structure is absent from *Thebanuspis welshii*, the species possesses librigenae of the normal *Thebanuspis* type (Pl. 18, fig. 13), and the similarities with warburgellines are considered convergent.

*Thebanuspis welshii* is distinguished from all congeners in the possession of a very shallow cranidial anterior border, defined posteriorly in smaller specimens (Pl. 18, figs. 10a, 11a), but grading anteriorly onto the border without a break in slope (Pl. 18, figs. 9e, 10b, 11b), and a pygidium that is subrounded versus deltiform in posterior outline and which retains only slight marginal sinuosity.

**Material:** Holotype, cranidium, ROM 53016 (Pl. 18, fig. 9a-e), from section ABR 1 22 m; paratypes ROM 53017-53023, from section ABR 1 22 m, Cape Phillips Formation, Wenlock (upper Homerian, Colonograptus ludensi Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

**Etymology:** After Greg Welsh.

*Thebanuspis smithi* n. sp.  
Pl. 19, figs. 1-14

**Diagnosis:** Cephalon strongly vaulted; glabella with coarsest and densest tuberculate sculpture known in genus; median occipital node very large and robust; cephalic border very broad; librigenal...
field wide and with dense tuberculate sculpture; eye socle anteriorly bicomposite, split into two thin bands; pygidium short, axis inflated, axial rings with prominent sculpture of fine tubercles.

Discussion: Thebanaspis smithi occurs together with T. jefferyi, but the species are so distinct that there is essentially no danger of misassociation of sclerites. Thebanaspis smithi is immediately distinguished from other Cape Phillips Formation species by the robust suite of apomorphies given in the diagnosis. The most similar species appears to be the poorly known taxon figured by Norford (1981, pl. 7, figs. 4-10) as Cyphoproetus sp. Norford's species shares with T. smithi a strongly vaulted cranidium and a small, subtriangular pygidium with the pleural bands strongly swollen and turned posteriorly, but differs in the presence of a fine, scrobiculate, versus coarsely tuberculate, dorsal glabellar sculpture.

Material: Holotype, cephalon, ROM 53025 (Pl. 19, fig. 1a-e), from talus boulder ABR 3TT; paratypes ROM 53026-53038, from talus boulder ABR 3TT (near Abbott River, northwestern Cornwallis Island) and section BH 2 2-3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Homarian, Cyrtograptus lundgreni-Monograptus testis Zone), central Canadian Arctic.

Etymology: After Andrew Smith.

Thebanaspis jefferyi n. sp.
Pl. 20, figs. 1-16

Diagnosis: Cranidium low; glabella weakly inflated and with very subdued dorsal sculpture; librigenal field lacking tuberculate sculpture; pygidium broad, variably rounded or pointed posteriorly, with 8-9 axial rings.

Discussion: Thebanaspis jefferyi n. sp. is the most similar of the new Arctic Wenlock species to the lower Llandovery southern Laurentian type species. Inasmuch as comparison is possible, it differs from T. thebana in the possession of a more anteriorly transverse glabella, much more incised glabellar furrows; and a pygidium with eight or nine versus ten axial rings, with the rings and pleural ribs more effaced posteriorly.

Thebanaspis jefferyi is similar to the contemporaneous T. strabismus, from the lower Homarian of England (see Owens, 1973, pl. 6, figs. 13-15, pl. 7, figs. 1, 2; Thomas, 1978, pl. 9, figs. 17, 18), differing in the possession of a less elongate glabella, less well incised glabellar lobes; and a pygidium with a less firmly impressed border. Thebanaspis putzkerni (Snajd r, 1976), from the lower Homarian of the Czech Republic, is extremely similar to T. strabismus, differing in the possession of a shorter pygidium with a wider axis. It is differentiated from T. jefferyi in the same ways as is T. strabismus. Cyphoproetus hedvicae (Snajd r, 1980, erected as a subspecies of putzkerni, is not related, but rather is a typical representative of Cyphoproetus. Thebanaspis semidepressus (Snajd r, 1975) is significant because of its stratigraphically intermediate position (upper Llandovery) between the lower Llandovery type and the lower Homarian species group. It compares very closely with T. jefferyi in its glabellar dimensions, particularly in the more transverse preglabellar furrow, but differs in its much more posteriorly rounded pygidial margin.

Material: Holotype, pygidium, ROM 53055 (Pl. 20, fig. 1a-c), from section BH 2 3 m; paratypes ROM 53042-53054, 53056, 53057, from section BH 2 3-7.5 m (southern Baillie-Hamilton Island) and section ABR 1 5-13.5 m and talus boulder ABR 3TT (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (lower to upper Homarian, Cyrtograptus lundgreni-Monograptus testis Zone to Colomograpbus? ludensis Zone), central Canadian Arctic.

Etymology: After Paul Jeffery.

Thebanaspis sp. 1
Pl. 18, fig. 17

Discussion: A single well preserved cranidium from upper Sheinwoodian strata on Baillie-Hamilton Island is strongly differentiated from the relatively common cooccurring species T. morrissi in the manner in which its glabellar tuberculation is aligned and merged to form a scrobiculate pattern. The specimen also has a less elongate and more anteriorly rounded glabella than T. morrissi, and has terrace lines restricted to the anterior and marginal parts of the anterior border, versus evenly distributed anteriorly and posteriorly (compare Pl. 18, fig. 17a with Pl. 17, fig. 2b). It is most similar to the mid-Sheinwoodian T. rutat, which lacks terrace lines on at least the most posterior part of the anterior border and displays a similarly anteriorly rounded glabella. No other sclerites that might be associated with the cranidium were recovered.

Material: Assigned specimen ROM 53024, from section BH 1 92 m, Cape Phillips Formation, Wenlock (upper Sheinwoodian, Cyrtograptus peregrinus-Monograptus opimus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Thebanaspis sp. 2
Pl. 19, figs. 15, 16

Discussion: A cranidium and librigena from lower Ludlow strata on Baillie-Hamilton Island appear to represent the youngest known species of Thebanaspis. The taxon is differentiated from all congenerics in its extremely fine and dense tuberculate sculpture on the glabella, anterior border, and librigenal field, and very prominent, anastomosing terrace lines on the librigenal lateral border.

Material: Assigned specimens ROM 53039, 53040, from section BH 2 56.5 m, Cape Phillips Formation, Ludlow (lower Gorstian, Lobograptus
progenitor Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Thebanaspis sp. 3
Pl. 19, fig. 17

Discussion: A single fragmentary cranidium from the lower Ludlow of Baillie-Hamilton Island does not belong to the species that occurs slightly higher in the same section, Thebanaspis sp. 2, differing in the much coarser and sparser dorsal tuberculate sculpture. The size of the tubercles is approached elsewhere only in T. smithi, but that species bears only a few very coarse tubercles against a background of dense, fine tubercles.

Material: Assigned specimen ROM 53041, from section BH 2.42 m, Cape Phillips Formation, Ludlow (lower Gorstian, Lobograptus progenitor Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Genus Westropia n. gen.

Type species - Westropia benfieldi n. sp., upper Sheinwoodian, Arctic Canada.

Other species - Westropia skipperae, lower Homerian, Arctic Canada.

Diagnosis: Glabellar elongate, forward tapering, weakly inflated; posterior section of facial suture exsagittally elongate and laterally convex behind eye; eye long and low; librigenal field elongate and tuberculate; genal spine short but cylindrical; pygidium with six or seven axial rings, strongly impressed pleural and interpleural furrows, and evenly arcuate posterior margin.

Discussion: Among well known proetids, the closest comparison for Westropia is perhaps a species from the upper Llandovery or lower Wenlock of North Greenland described as Xenocybe ebyconex Lane and Owens, 1982, which has broadly similar glabellar lobation, exsagittally elongate posterior section of the facial suture behind the eye, and similar overall dorsal sculpture. Differences between the taxa are profound, however. Xenocybe ebyconex has a nearly parallel-sided, versus forwardly tapering, glabella with a rounded, inflated frontal lobe; a short versus absent preglabellar field; an unusual posteriorly swollen librigenal field; and a pygidium with nine versus six or seven axial rings, a postaxial ridge, and a strong border and border furrow, at which the pleural furrows and ribs terminate. While it is possible that a relationship between the taxa may exist, the best course of action seems to be the erection of a new genus for the Cape Phillips Formation species, which are obviously closely related to one another and quite different from any known proetids.

Etymology: After Steve Westrop.

Westropia benfieldi n. sp.
Pl. 21, figs. 1-9

Diagnosis: Glabellar tuberculate sculpture fine and densely scattered; librigenal field with subdual sculpture; pygidium with seven axial rings, rings lacking dorsal tuberculate sculpture.

Description: Cranidium with maximum width, excluding posterolateral projections, across posterior sections of facial sutures behind palpebral lobe; width across exsagittal midlength of palpebral lobes very slightly less than maximum width; palpebral lobe very narrow; anterior fixigena in front of palpebral lobe quite broad, running onto subtriangular frontal area; palpebral lobe and frontal area with very fine, nearly granulate, dorsal tuberculation; frontal area with several large but subdued caecal pits; anterior sections of facial suture anteriorly convergent, laterally convex and parenthes shaped; posterior sections of facial suture immediately behind palpebral lobe more or less exsagittally aligned, very strongly produced laterally and parenthes shaped; anterior border furrow deep, short (sag., exsag.), and evenly arcuate; preglabellar field absent, preglabellar furrow abutting anterior border furrow; anterior border short, of similar length sagittally and exsagittally, with strong, subcylindrical dorsal convexity, sculpture of closely spaced subparallel terrace lines on both dorsal and marginal aspect, interspersed with very fine granules; axial furrow very deep and incised, running without break or deflection into preglabellar furrow; glabella subconical, with strong anterior taper; glabella width maximum width across L1, very slightly less than sagittal length; S1 and S2 sinuous and postero-medially directed; median fork of S1 very subdual, evident only on some specimens (Pl. 21, fig. 5a); L1, L2, and L3 with moderate independent inflation; entire glabella with dorsal sculpture of small to moderate sized, densely packed tubercles; S0 deep and incised laterally, becoming slightly longer and shallower medially, posteriorly convex around L1, anteriorly convex medially; lateral occipital lobes fully isolated, very strongly inflated, with tuberculate sculpture slightly finer than that on anterior glabella; L0 long medially, but with considerable dorsal sagittal convexity, sculpture of densely packed granulose tubercles, finer than those on lateral occipital lobes; median occipital node very subdual, set slightly posterior to half sagittal length of ring; posterior border short, of similar length proximally and distally, with strong dorsal convexity but lacking tuberculate sculpture; posterior border furrow short and incised, small sutural ridge developed along anterior edge of furrow (Pl. 21, fig. 1a).

Librigenal field with minimum width about 32 percent maximum exsagittal length; eye elongate but very low; eye socle very narrow and subdual; subocular area relatively broad and depressed, subocular ridge absent; field with sculpture of densely distributed fine tubercles, slightly larger adaxially; posterior border furrow short (exsag.) and incised; lateral border furrow wider and sli-
posteriorly convergent, meeting to fully define posteriorly around lating half ring 58-60 percent maximum width; ring very short (sag., on lateral border; opposite cylindrical, nearly evenly lobes subparallel terrace lines slightly mainaoriginal sculpture; anterior and posterior pleural bands of pleural band defined for posterioi border nanow posterioi

Discussion: Westropia benfieldi n. sp. is distinguished from the younger W. skipperae in the possession of finier dorsal glabellar tuberculate sculpture; fine versus quite coarse librigenal field tubercles; a broader subocular area; and a pygidium with a slightly more subcircular posterior margin, narrower axis, seven versus six axial rings, essentially absent versus prominent dorsal tuberculation on the rings, and coarser marginal terrace lines on the border.

Material: Holotype, cranidium, ROM 53058 (Pl. 21, fig. 1a-c), from talus boulder ABR TTD; paratypes ROM 53059-53066, from talus boulders ABR TTD and ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian, Cyrtograptus. perneri-Monograptus opimus Zone), near Abbott river, northwestern Cornwallis Island, central Canadian Arctic.

Etymology: After John Benfield.

Westropia skipperae n. sp.
Pl. 21, figs. 11-19

Diagnosis: Glabellar sculpture of moderately large tubercles; librigenal field with large, densely packed tubercles; pygidium broad, with six axial rings bearing densely distributed small to moderate sized tubercles.

Discussion: Westropia skipperae n. sp. was compared with W. benfieldi above.

Material: Holotype, pygidium, ROM 53073 (Pl. 21, fig. 16a-d), from talus boulder ABR 3TT; paratypes ROM 53068-53072, 53074-53076, from talus boulder ABR 3TT (lower Homerian, C. hundgvent-Monograptus testis Zone) and section ABR 1 13.5 m (upper Homerian, Colonograptus? ludensis Zone), Cape Phillips Formation, Wenlock, near Abbott River, northwestern Cornwallis Island.

Etymology: After Jackie Skipper.

Westropia sp.
Pl. 21, fig. 10

Discussion: A single fragmentary cranidium from mid-Sheinwoodian strata on Baillie-Hamilton Island represents the oldest known species of Westropia. From what few comparisons can be made, the specimen is less similar to the upper Sheinwoodian W. benfieldi, which has much finer and more densely distributed glabellar tuberculate sculpture, but compares more closely to the lower Homerian W. skipperae, which has more similar sculpture.

Material: Assigned specimen ROM 53067, from section BH 1110 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, Monograptus instrinus-Cyrtograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Genus Winiskia Norford, 1981

Type species - Winiskia perryi Norford, 1981, Telychian or lower Sheinwoodian, northern Ontario.

Other species - Winiskia curranti n. sp., lower Homerian, Arctic Canada; W. longbottomae n. sp., upper Sheinwoodian, Arctic Canada; W. youngi n. sp., mid-Sheinwoodian, Arctic Canada; Proetus (Lucanoporaspis) cf. confossus of Owens (1973, p. 17, pl. 4, figs. 9, 10).

Discussion: Three species from the Wenlock of the Cape Phillips Formation are obviously closely related, united in the possession of a low, distinctively elongate glabella lacking sculpture, a prominently inflated eye socket, very reduced subocular area and unsculptured librigenal field, a genal spine reduced to a small nub in holaspids, and a pygidium with seven or eight axial rings and a
strong border. There are some similarities with members of Proetus s.s., including the absent sculpture, occasionally elongate glabella, and strong pygidial border. The closest comparison, however, appears to be with Winiskia perryi Norford, 1981, from the upper Llandovery or lower Wenlock of the Hudson Bay Lowlands. This older species differs from the Cape Phillips Formation taxa primarily in the possession of an elongate genal spine and a wider cephalic border furrow (termed a "tropical depression" by Norford).

Reduction of the genal spine is a general feature of proetid ontogeny (note the more elongate genal spines in small librigena of W. youngi, Pl. 22, fig. 6, W. curvata, Pl. 23, figs. 12, 13, and W. longibettae, Pl. 24, fig. 3), and it is reasonable to expect it is the plesiomorphic condition for clades which have lost the spine in holaspides. Given that W. perryi is considerably older than the Cape Phillips Formation species, the presence of an elongate spine probably indicates that it is a more primitive species, and does not preclude close relationship. Winiskia shares so many features with Proetus s.s. that a sister-group relationship is possible. Proetus differs mainly in the possession of a much broader and more inflated cephalic border, much larger eyes with a less distinct socle, much reduced librigena field, and the ubiquitous presence of a robust genal spine, although this may be a plesiomorphic retention.

Winiskia youngi n. sp.
Pl. 22, figs. 1-10; Pl. 23, figs. 1-8

1977 Proetus (s.l.) sp., Perry and Chatterton, p. 290, pl. 1, figs. 3-8 (non figs. 1, 2 = Pseudocennesis cocksii n. sp.)

Diagnosis: Librigena field narrow; librigena lateral border furrow narrow and incised; genal spine retained as small point in large specimens; seven pygidial axial rings; pygidial axis relatively short and broad; pygidial border furrow shallow and border broad.

Description: Cranidium with width across exsagittal midlength of cephalon lobes about 80 percent sagittal length; anterior sections of facial sutures strongly anteriorly divergent; posterior sections with short, straight, nearly exsagittally aligned course behind palpebral lobes; palpebral lobes very narrow; anterior border moderately long, of similar length sagittally and exsagittally, with dorsal and marginal sculpture of very fine, close-set terrace lines; anterior border furrow quite long and shallow, somewhat longer sagittally; frontal areas broad, with very fine and subdulced caecal pitting; very short preglabellar field retained, preglabellar and anterior border furrows nearly abutting; glabella elongate, more or less fiddle-shaped; axial furrows deepest opposite palpebral lobes, slightly shallower posteriorly and anteriorly; margin of glabella bowed laterally opposite palpebral lobe; axial furrow essentially contiguous with preglabellar furrow, contact angular in anterior view (Pl. 22, figs. 1c, 2d); glabella lacking tuberculate sculpture; glabellar furrows indistinct; 50 relatively short (sag., exsag.), similar in depth to deepest part of axial furrow; lateral occipital lobes inflated, set off from remainder of L0 by nearly complete furrow, not protruding laterally beyond general glabellar outline; main part of L0 long (sag.), nearly flat dorsally, lacking sculpture; median occipital node distinct but small, set slightly posterior to half sagittal distance of ring.

Librigena field with minimum width 25-30 percent exsagittal length; eye with exsagittal length about 33 percent overall length of librigena including anterior projection; eye socket complete and quite strongly inflated; subocular area small, narrow, depressed, subocular ridge absent; field smooth, lacking sculpture, with gentle dorsal convexity; posterior and lateral border furrows of very similar breadth and depth, both incised and moderately deep, meeting at angular contact in front of genal angle; posterior border about 75 percent as long as lateral border is wide; both posterior and lateral borders with dorsal and marginal sculpture of relatively coarse terrace lines, more robust on lateral border, uniting at genal angle and abutting very short, subtriangular genal spine; doublure quite broad, with subparallel terrace lines becoming more widely spaced toward inner edge; panderian opening present, but extremely subtle.

Rostral plate (Pl. 22, fig. 2) subtriangular; connective sutures meeting posteriorly; sculpture of fine subparallel terrace lines contiguous with those of the librigenal anterior projections.

Hypostome not identified.

Thorax with axis occupying about 44 percent of width anteriorly, increasing to about 48 percent posteriorly; axial furrow shallow; pleural furrow with nearly transverse course for all of width, incised, shallowed abruptly near very weak contact with axial furrow; anterior and posterior pleural bands subequal in exsagittal length; fulcra set at about 60 percent distance distally on anterior segments, reduced to about 50 percent posteriorly; articulatory boss at fulcra triangular and sharply defined; articulating facet not markedly distinct, pleural furrow terminating at proximal end of facet; pleural tip lobate, expanded slightly posteriorly, with very small spine/tubercle on posterolateral extremity; axial ring longer (exsag.) laterally, shortened medially, bowed anteriorly; articulating half ring relatively long, with low dorsal convexity in sagittal profile; preannular lobe short and relatively small; articulating furrow deeply incised; preannular furrow shallow but distinct; thorax entirely lacking dorsal sculpture.

Pygidium with sagittal length (including articulating half ring) 60 percent maximum width; axis with maximum width 77-78 percent sagittal length; anterior margin of pleura sharply angular across fulcrum and fulcral boss; posteriorly margin curving arcuate and nearly semi-circular in larger specimens (Pl. 23, figs. 1, 5a, 6), with distinct posteromedian point in smaller specimens (Pl. 22, fig. 10a; Pl. 23, figs. 7, 8); axial furrows relatively deep, with moderate posterior convergence, meeting posteriorly to fully and strongly define rear of axis, bowed laterally around second axial ring; seven axial rings present; first axial ring and articulating half ring with morphology similar to that of thorax,
except preannular lobe very short and reduced; first axial ring drawn postero-medially, so that posteromedian margin is either nearly transverse (Pl. 23, fig. 5a) or posteriorly convex (Pl. 23, figs. 1, 7); first ring furrow long, very small second preannular lobe developed in some specimens (Pl. 23, fig. 5a); posterior rings increasingly effaced, with very subdued lateral muscle impression; pleural furrows much deeper than very weak interpleural furrows; first pleural furrow deep and strongly incised, posterior furrows shallower, becoming more shallow posteriorly; anterior pleural bands about twice length of posterior bands, moderately inflated, lacking dorsal sculpture; border furrow broad and very shallow; border very broad and prominent, pleural furrows continued very weakly onto proximal part; border with sculpture of terrace lines, subparallel with posterior margin posteriorly, curved away from margin anteriorly; doublet longer exagisatally than sagittally (Pl. 22, fig. 10b), with prominent terrace lines, coarser toward inner margin.

**Discussion:** Winiskia youngi n. sp. is distinguished from the younger W. longbottomae n. sp. in its nearly smooth versus granulate glabellar sculpture; much less impressed S1; relatively larger palpebral lobes; narrower lirigenous field; narrower lirigenous lateral border; subrounded versus thorn-shaped genal spine; and particularly in the possession of a much shorter pygidium with seven versus eight axial rings, a blunter axial termination, posteriorly effaced rings, and a slightly weaker border. Winiskia youngi differs from the Homeriidn, Winiskia curranti in the possession of a glabella that is laterally convex, versus laterally concave opposite the palpebral lobe; a much larger eye; much smaller and narrower lirigenous field with a much more incised lateral border furrow; stubby versus nearly completely reduced genal spine in large specimens; seven versus eight pygidial axial rings; a much shorter pygidial axis; and a much shallower pygidial border furrow and broader border.

**Differences between all of the Cape Phillips Formation species and the uppermost Llandovery/lower Wenlock type species are outlined in the generic discussion above.**

**Material:** Holotype, pygidium, ROM 53106 (Pl. 23, fig. 16a-c), from talus boulder ABR 3TT; paratypes ROM 53099-53105, 53107, from talus boulder ABR 3TT (near Abbott River, northwestern Cornwallis Island) and section BH 2.3 m (southern Bailie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Homeriidn, Cyrtograptus hurgeni-Monograptus tesi Zone), central Canadian Arctic.

**Etymology:** After Andy Currant.

**Winiskia longbottomae** n. sp.

**Pl. 24, figs. 1-13**

**Diagnosis:** Dorsal glabellar sculpture of very fine, granulate tubercles, with S1 distinct as smooth area; lirigenous lateral border broad; genal spine retained and thornlike in large specimens; eight pygidial axial rings with axis long; pygidial border furrow of moderate depth.

**Discussion:** Winiskia longbottomae n. sp. is compared with W. youngi and W. curranti above.

**Material:** Holotype, cranidium, ROM 53109 (Pl. 24, fig. 2a-d), from talus boulder ABR TTC(3); paratypes ROM 53108, 53110-53120, from sections BH 1.92 m and BH 1.164-2.04 m and locality BHH-C (southern Bailie-Hamilton Island) and section ABR 2.18 m and talus boulders ABR TTD, ABR TTC(3), and ABR TTC(S) (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, Cyrtograptus perneri-Monograptus opimus Zone), central Canadian Arctic.

**Etymology:** After Alison Longbottom.

**Genus Coniproetus** Alberti, 1966

**Type species - Proetus (Proetus) condensus** Pribyl, 1965, Pragian, Czech Republic.

**Discussion:** Owens (1973, p. 10, text-fig. 3C, D) considered Proetus (Proetus) condensus to be a junior synonym of the species glandiferus Novák, 1890, effectively making the latter the type of Coniproetus. Snajdr (1980, pl. 8, figs. 7, 8), however, refigured the holotype cranidium of condensus, and argued that the species was a synonym of novakii Pribyl, 1964. He reassigned glandiferus to Longiproetus. Based upon the distinctive tuberculate/scrobiculate sculpture shared by the cranidium.
and the pygidium (Snajdr, 1980, pl. 8, fig. 9) that is the holotype of novaki. Snajdr's arrangement would appear to be correct. Hence, novaki is effectively the type species of Coniproetus.

The content and phylogenetic structure of Coniproetus are difficult to assess. There is a plexus of species, including the new Wenlock taxon described below, all sharing a forwardly tapering, bullet-shaped glabella and a pygidium with a distinctively impressed border. This broad group is now generally termed Coniproetus, but its relationship to C. novaki is by no means clear. In fact, members of this group are more convincingly related to a group of Lower and Middle Devonian species from eastern North America.

Lieberman (1994) discussed this group as Basidechenella Richter, 1912. Despite a lengthy attempt at phylogenetic analysis of the group (Lieberman, 1994, p. 83-89, fig. 22), the morphology of the type species, B. kayseri Richter, 1912, was not referred to, and recent photographic illustrations of the type material (Morris & Fortey, 1985, pl. 6, figs. 13, 14) were not cited. As discussed by Ormiston (1967, p. 68), B. kayseri is an unambiguous dechenellid, and not related to the eastern North American species. Ormiston's opinion was that a new subgeneric taxon was required for the American taxa. This was supplied by Pillet (1972), who erected Pseudodechenella with the New York State species rowi as type. A further complication is the erection of Arcticornisostia Lieberman, 1994, for some, but not all, of the species in a morphological group centered around Dechenella (Basidechenella) laticaudata Ormiston, 1967. Proetus (Coniproetus) whittakerensis Chatterton & Perry, 1977, and Coniproetus elliptiae n. sp. Finally, Yolkin's (1966) taxon Lacunoporaspis may also represent a component of the overall group. A well-founded classification can only be arrived at through competent cladistic analysis of the group. For present purposes, I assign the new Cape Phillips Formation species to Coniproetus, pending the development of a robust hypothesis of phylogenetic structure. It is possible that the group as a whole will eventually be shown to form a clade to the exclusion of C. novaki, in which case Pseudodechenella will become the appropriate name.

Coniproetus elliptiae n. sp.
Pl. 25, figs. 1-10; Pl. 26, figs. 1-6, 8

Description: Glabella with strong anterior taper; palpebral lobes small; subocular area and subocular ridge quite strongly developed; genal spine short; pygidium with relatively weak border and seven axial rings.

Discussion: Coniproetus elliptiae n. sp. is the earliest known member of a very similar group of species including C. whittakerensis Chatterton & Perry, C. antiqua (Yolkin, 1966), and C. laticaudata (Ormiston, 1967), from any of which it differs chiefly in relative proportions of the exoskeleton.

Coniproetus antiqua was originally described as a species of Lacunoporaspis Yolkin, 1966. The type species of Lacunoporaspis, L. contermina Yolkin, 1966, is less obviously related to C. elliptiae, but may form part of a larger and more inclusive clade (see generic discussion). Coniproetus elliptiae differs from C. antiqua in its less elongate glabella; much smaller palpebral lobes; slightly shorter anterior border; and especially in its narrower pygidium with less well impressed anterior border and seven versus eight axial rings.

Coniproetus elliptiae differs from C. laticaudata in its less fiddle-shaped, much less anteriorly produced glabella; less incised glabellar furrows; much smaller palpebral lobes; smaller frontal areas; shorter anterior border with coarser terrace lines developed more posteriorly; shorter, less narrow and less tapering genal spine; coarser terrace lines on librigenal lateral border; narrower subocular area but more prominent subocular ridge; and pygidium with a less pronounced border, broader axis, and seven versus at least nine axial rings.

Material: Holotype, cranidium, ROM 53121 (Pl. 25, fig. 1a-e), from section ABR 1 17 m; paratypes ROM 53122-53137, from section ABR 1 17-22 m, Cape Phillips Formation, Wenlock (upper Homerian, Colonograptus? ludensis Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

Etymology: After Tracey Elliott.
(Pl. 27, figs. 3a, 4a); posterior sections of facial sutures straight and posteriorly convergent behind palpebral lobes; glabella with width 95 percent sagittal length; glabella widest across rear of L1; axial furrows slightly anteriorly convergent opposite L1 and posterior part of L2, strongly convergent from anterior part of L2, running without interruption or break into preglabellar furrow, defining strongly tapering anteromedian part of glabella; axial and preglabellar furrows deeply incised; dorsal glabellar sculpture of fine, subduced, but densely spaced tubercles; glabellar furrows not incised, defined as areas lacking tuberculate sculpture; S1 obliquely inclined, lengthened proximally at fork, isolated median fork retained as very faint pit in some specimens (Pl. 27, fig. 4a), not obvious in others (Pl. 27, figs. 2a, 7a); S2 isolated from axial furrow in most specimens, but rarely in contact (Pl. 27, fig. 4b); S3 narrow and isolated; S0 long (sag., exsag.), deep anteriorly behind steeply sloping rear of anterior glabella, shallowed posteriorly; L0 long, shell-like, with little sagittal convexity; lateral occipital lobes relatively subduced, not isolated from main part of L0, with only weak independent inflation; median occipital node small and subduced, set slightly posterior to half distance along ring; palpebral lobe elongate and narrow; frontal area broad due to strong taper of glabella, with fine and dense caecal pitting; anterior border furrow very shallow, very slightly longer sagittally than exsagittally; anterior border long, with low dorsal convexity and sculpture of subduced subparallel terrace lines developed on anterodorsal and marginal aspect.

Lobridgeal field with minimum width about 20 percent of exsagittal length; eye socket narrow but moderately inflated posteriorly, becoming effaced anteriorly; subocular area narrow but strongly depressed, lacking sculpture; field with sculpture of relatively dense but very subduced caecal pitting; posterior border furrow nearly straight, short, and deeply incised; slightly depressed, sublunate area developed on field adjacent to proximal part of posterior border furrow (Pl. 26, figs. 16, 17; Pl. 27, fig. 9a); posterior border lacking sculpture, narrower than lateral border; lateral border furrow relatively broad and shallow; lateral border broad and inflated with subduced, nearly effaced sculpture of subparallel terrace lines on lateral and marginal aspect; posterior and lateral border furrows uniting in front of genal angle to run distally along dorsal aspect of genal spine; genal spine elongate, tapering only slightly for most of its length, strongly around distalmost part; doublure with subparallel terrace lines anteriorly more robust than those on lateral border, lines diverging on venter of genal spine; panderian opening quite broad.

Rostral plate subtrapezoidal, with strong ventral convexity in sagittal profile; connective sutures not meeting posterior, rear of plate transverse; ventral sculpture of fine terrace lines continuous with those on lobiodeal doublure.

Hypostome with anterior margin moderately anteriorly convex, slightly ventrally downturned; lateral margins posteriorly convergent in front of shoulder; shoulder very strongly extended laterally; margin laterally concave immediately behind shoulder, arcuate but slightly transverse posteriorly; lateral border and posterior border contiguous, of similar width everywhere, strongly ventrally convex, with sculpture of 2-3 terrace lines, set slightly obliquely to course of border; border furrows deepest anterior to shoulder, broader posteriorly; middle furrow very shallow, running posteriorly to form protuberant keel; maculae small and indistinct; posterior lobe of middle body moderately inflated, with robust laterally convex terrace lines uniting anteriorly to form protuberant keel; maculae small and indistinct; posterior lobe of middle body short and crescentic.

Pygidium with sagittal length (including articulating half ring) 57-62 percent maximum width; axis with maximum width 78-85 percent sagittal length; anterior margin of pleura deflected strongly at prominent fulcrum process; posterior margin arcuate laterally, expanded and more transverse medially; axial furrow very shallow, deepening slightly behind first ring, shallowing around rear of axis, but rear of axis defined; articulating half ring long, of relatively even length in middle part, tapering rapidly laterally; very short and subduced preannular lobe present on first ring articulating furrow deeper than preannular furrow, but preannular furrow distinct; six axial rings present; rings drawn posteromedially, with subduced median protuberance at posterior margin; rings posterior to first with relatively well impressed lateral muscle impression; first ring furrow deep, posterior furrows becoming increasingly shallow, posterior rings nearly effaced; rings entirely lacking dorsal tuberculate sculpture; first pleural furrow deep and strongly incised; posterior pleural and interpleural furrows similar in depth but very shallow, becoming more shallow posteriorly; pleura with moderate dorsal convexity; border furrow very shallow, pleural and interpleural furrows running into and terminating within border furrow; border broad and flat, with well-expressed parallel terrace lines around marginal aspect; margin sinuous, strongly downturned anteriorly; doublure not fully preserved on any specimen, with sculpture of closely packed, robust terrace lines.

Discussion: Coniproetus amphletae n. sp. is most similar among known northern Laurentian diversity to the older (mid-Subborealian) species from the Delorme range of the Mackenzie Mountains described as Proetus (Coniproetus) sp. by Perry and Chatterton (1979). The species differ primarily in that the glabellar furrows of C. amphletae are much less incised; C. amphletae has a very short preglabellar field whereas the Mackenzie Mountains species does not appear to; and C. amphletae has slightly longer (exsag.) posterior sections of the facial suture behind the palpebral lobes, a more deeply impressed lobiodeal subocular area, and longer genal spines. Pygidia of the species appear to be very similar, with a broad, weak border, narrow axis, and six axial rings.

Material: Holotype, cranidium, ROM 53151 (Pl. 27, fig. 4a-c), from section ABR 1 22 m; paratypes ROM 53138-53150, 53152-53156, from sections
ABR 1 22 m and ABR 3 24+ m, Cape Phillips Formation., Wenlock (upper Homarian, Colono-
graptus? ludensis Zone), near Abbott River, northwestern Cornwallis Island, central Canadian
Arctic.

Etymology: After Claudia Amphlett.

Genus Cyphoproetus Kegel, 1927

Type species - Cyphaspis depressa Barrande, 1846, Wenlock, Czech Republic.

Cyphoproetus n. sp. A
Pl. 28, figs. 16-21

Discussion: Material of Cyphoproetus occurs at successive Sheinwoodian horizons in the Cape
Phillips Formation, and two distinct species appear to be represented. Neither is well enough
for formal naming. The mid-Sheinwoodian Cyphoproetus n. sp. A differs from the upper
Sheinwoodian C. n. sp. B in the possession of a less posteriorly tuberculate anterior border; an apparently
absent versus very short but distinct preglabellar field; broader librigena field with slightly coarser
tubercles; a more blunt posterior termination of the pygidial axis; and a relatively narrower pygidium.

Material: Assigned specimens ROM 53172-
53177, from section BH 1 110-112, Cape Phillips
Formation, Wenlock (mid-Sheinwoodian, Monograptus instreunus-Cyrtograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Cyphoproetus n. sp. B
Pl. 28, figs. 22-32

Discussion: This taxon is somewhat better known than the older Cyphoproetus n. sp. A, with
which it is compared above. Both of these species are very similar to the type species, C. depressus
(see Snajdr, 1980, pl. 17, figs. 1-8). Cyphoproetus n. sp. B differs from C. depressus particularly in its
considerably shorter anterior border and more elongate and anteriorly tapering glabella.

Material: Assigned specimens ROM 53178-
53188, from sections BHL 1 92 m and BH 1 204 m,
and localities BHH-A and BHH-C (all southern
Baillie-Hamilton Island), and section ABR 2 27 m
and talus boulder ABR TTC(3) (both near Abbott
River, northwestern Cornwallis Island), Cape
Phillips Formation, Wenlock (upper Sheinwoodian,
Cyrtograptus perneri-Monograptus optimus Zone),
central Canadian Arctic.

Indeterminate proetine spp.
Pl. 21, figs. 20-23

Discussion: Three librigena recovered from
mid-Sheinwoodian strata on Baillie-Hamilton Island
cannot be assigned to any of the known cooccurring
taxa and evidently represent rare, additional species.
Two (Pl. 21, figs. 22, 23) appear to be conspecific,
bearing an elongate genal spine and very broad
librigenal lateral border. Of Cape Phillips diversity,
the closest comparison may be with a younger spe-
cies of Pseudogerasforos, P. fortysi, librigena of which
differ mainly in having a much narrower lateral bor-
der furrow (compare Pl 8, figs. 12, 15). However,
the cooccurring species P. cocksi has very different
librigena (associated with considerable confidence
on the basis of frequency of occurrence), with quite
densely tuberculate fields (e.g., Pl. 10, fig. 11b).
Hence, the unassigned librigena may represent a
rare second species of Pseudogerasforos.

Another librigena (Pl. 21, fig. 21) somewhat
resembles those of Pseudogerasforos cocksi, but dif-
ers in its very short, subtriangular genal spine and
shallower lateral border furrow. It could conceiv-
ably represent an aberrant P. cocksi sclerite, but
seems more likely to be a very rare separate species.

Material: Figured specimens ROM 53077-53080,
from sections BH 1 110-112 m and BHL 1 0 m,
Cape Phillips Formation, Wenlock (mid-
Sheinwoodian, Monograptus instreunus-Cyrt-
ograptus kolobus Zone), southern Baillie-Hamilton
Island, central Canadian Arctic.

Family Tropidocoryphidae Pribyl, 1946
Subfamily Tropidocoryphinace Pribyl, 1946

Tropidocoryphine sp. 1
Pl. 28, figs. 1-3, 5, 6

Discussion: Tropidocoryphines have a thin cuti-
cle and as a result are very rare in silicified Cape
Phillips Formation collections, which are biased
toward preservation of thick sclerites. Only from
finely silicified samples from the upper
Sheinwoodian of Baillie-Hamilton Island have any
number of specimens been recovered. At least three
separate species appear to be represented, but asso-
ciations in the present state of knowledge are quite
tenuous.

Tropidocoryphine sp. 1 is perhaps most similar to the Lower Devonian species from the Czech
Republic described by Snajdr (1976, 1980) as
Bojocoryphes splendid. The species share a pattern of several anastomosing tropidial ridges on the pre-
glabellar field, as well as raised, anastomosing sculpture on the librigenal field. They differ particu-
larly in the presence in B. splendid of much more
anteriorly divergent anterior sections of the facial
sutures.

Material: Assigned specimens ROM 53157-
53161, from section BH 1 92 m and locality BHH-
A, Cape Phillips Formation, Wenlock (upper
Sheinwoodian, Cyrtograptus perneri-Monograptus
optimus Zone), southern Baillie-Hamilton Island,
central Canadian Arctic.

Tropidocoryphine sp. 2
Pl. 28, figs. 8-11, 13

Discussion: A second tropidocoryphine species
seems distinct from tropidocoryphine sp. 1 is
having much more broken tropidial ridges on the preglabellar field and an apparently smooth anterior part of the glabella. Libriigenae are associated, tentatively, on the basis of their strong linear terrace lines on the lateral border, matching those of the anterior border of the cranidia, and relatively weak tropidial ridges on the field.  

**Material:** Assigned specimens ROM 53164-53168, from locality BHH-A (southern Baillie-Hamilton Island) and talus boulder ABR TTD (northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus* Zone), central Canadian Arctic.

*Tropidocoryphine* sp. 3  
Pl. 28, figs. 4, 7

**Discussion:** A cranidial fragment likely represents a third tropidocoryphine species, distinct from the others in the absence of ridges on the preglabellar field, much greater dorsal convexity, and the presence of a very fine scrobiculate sculpture. A Libriigena is associated, very tentatively, on the basis of a similar absence of ridges and the lack of other taxa to which it might be assigned. The species might be assigned to the very broadly conceived taxon *Decoroproetus* Pribil, 1946, but much more information is required.

**Material:** Assigned specimens ROM 53162, 53163, from section BHI 1 92 m and locality BHH-A, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

*Tropidocoryphine* sp.  
Pl. 28, fig. 12

**Discussion:** A librigena from mid-Sheinwoodian strata on Baillie-Hamilton Island is very similar to, and may even be conspecific with, those younger sclerites assigned to tropidocoryphine sp. 2 (see above), but there is not enough information to be certain.

**Material:** Assigned specimen ROM 53169, from section BHI 1 110 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instreatus-Cyrtograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Subfamily *Cornuproetiinae* Richter,  
Richter & Struve 1959  
Genus *Interproetus* Snajdr, 1977

**Type species** - *Proetus intermedius* Barrande, 1846, from the Ludlow of the Czech Republic.

**Discussion:** See Siveter (1989, p. 115).

*Interproetus* wellsaee n. sp.  
Pl. 29, figs. 1-16; Pl. 30, figs. 1-3, 8

**Diagnosis:** Preglabellar field very short; anterior border furrow only gently arcuate; glabella slightly fiddle shaped; terrace lines developed adaxially on librigenal lateral border; pygidium and pygidial axis long relative to width, axis with five fully developed axial rings.

**Description:** Cranidium with width across mid-length of palpebral lobes 77 percent sagittal length; width across maximum point of divergence of anterior sections of facial sutures 81-82 percent width across palpebral lobes; anterior sections of facial sutures slightly anteriorly divergent in front of palpebral lobes, laterally convex and slightly parenthesized opposed frontal area; posterior sections of facial sutures short and laterally concave immediately behind palpebral lobes; palpebral lobes long but quite narrow, lacking dorsal sculpture; anterior margin of anterior border arcuate, with gentle anterior convexity; anterior border long, with very low dorsal convexity, sculpture of subparallel terrace lines restricted to anterior and marginal parts; anterior border furrow shallow and long (sag., exsag.); connective sutures opposite anterior border strongly laterally convex; very short but distinct preglabellar field present; preglabellar field and relatively broad, subtriangular frontal area lacking sculpture; glabella with maximum width across front of L1 subequal to sagittal length; axial furrows gently anteriorly convergent, flexed laterally opposite palpebral lobes; very shallow and turned out opposite L1; contact between axial and preglabellar furrows (Pl. 29, fig. 1e), preglabellar furrow more or less evenly arcuate; axial and preglabellar furrows similarly incised; glabellar furrows not prominent on most specimens, glabellar lacking obvious dorsal sculpture; S0 deep, rear of anterior part of glabella nearly vertical; S0 with shallow "W" shape, flexed back around posteriorly inflated L1; L0 long and shelf-like, with slight dorsal sagittal convexity, lacking sculpture except for very small median node set at half distance along ring.  
Libriigenal field with minimum width about 25 percent exsagittal length; eye long and low, held obliquely; eye socle very narrow, more sharply defined along contact with eye; very weak subocular depression, deepest at midlength; field lacking obvious sculpture; posterior border furrow short and incised, expanded proximally into subulate depression on field (Pl. 29, figs. 7a, 10); lateral border furrow slightly deeper and broader than posterior border furrow; lateral and posterior border furrows uniting in front of genal angle, continued posteriorly along genal spine; posterior border quite long, lacking sculpture; lateral border slightly narrower than posterior border is long, with sculpture of prominent, subparallel terraced lines on lateral and marginal parts; terrace lines continued along both inner and outer aspects of genal spine; genal spine long and evenly tapering; doublure with subparallel terrace lines somewhat less robust and more closely spaced than those on lateral border; weak panderian opening present.
Rostral plate unknown.

Hyposome poorly known (Pl. 29, fig. 4); lateral border widening slightly around shoulder; grading smoothly into broader posterior border; shoulder flared and subrounded; lateral border furrow relatively wide and shallow, becoming less incised posterior border furrow; middle body elongate, with moderate ventral inflation, lacking sculpture; middle furrow and maculae not apparent.

Thoracic segment with axis occupying 28-40 percent overall width; axial furrow very shallow, exsagittally aligned; axial ring of approximately even length (sag., exsag.), lacking dorsal sculpture; indistinct preanular lobe only partially set off from axial ring by weak preanular furrow; articulating furrow deep and "W"-shaped; articulating half ring long, posteriorly lobate; anterior and posterior pleural bands nearly equal in length; pleural furrow deeply incised, deepest at fulcrum, shallowing proximally and distally, very weak contact with axial furrow; pleura lacking dorsal sculpture; anterior and posterior bands merged and expanded distally, articulating facet set off by small ridge; small, thorn-like spine set posterolaterally on tip; doublure narrow beneath tip, with small lateral notch posteriorly.

Pygidium with sagittal length (including articulating half ring) about 50 percent maximum width; axis with width about 80 percent of sagittal length; anterior margin of pleura nearly arcuate, rounded angle at fulcrum; posterior margin mediolaterally transverse, rounded laterally; axial furrow shallow, posteriorly convergent, not fully meeting posteriorly, rear of axis grading into border mediually; axial rings with "M"-shaped posterior margin, lacking dorsal sculpture, those behind the first with moderate to deep lateral muscle pits; preanular absent from first ring, but developed between first and second ring; articulating furrow very deep and incised; five axial rings present; median part of rings drawn posteriorly; first pleural furrow deep and incised, posterior furrows much shallower; interpleural furrows shallower than pleural furrows; anterior and posterior pleural bands subequal in length, lacking sculpture; relatively broad, flat border developed, broadening posteriorly, first pleural furrow intruding on border, posterior furrows reflected only as very weak crenulations; pygidial margin essentially transverse in posterior view, lacking sculpture; doublure not preserved on any recovered specimen.

Discussion: Interproetus wellsae n. sp. is most similar to I. galvani Siveter, 1989, from the upper Wenlock or lower Ludlow of western Ireland, and I. xenon Snajdr, 1980, from the lower Ludlow of the Czech Republic. Interproetus wellsae differs from I. galvani in its less anteriorly arcuate anterior border and border furrow; shorter preglabellar field; less dense scrobiculate sculpture (although this is certainly somewhat obscured by relatively coarse silification in some of the Cape Phillips Formation specimens); librigenal lateral border with subparallel terrace lines developed much more adaxially, versus restricted to marginal parts; and particularly in its pygidial that is longer relative to its width, with a longer, narrower axis bearing typically five versus typically four fully developed axial rings, and posteromedian margin that is transverse or arcuate versus medially embayed. Pygidia of I. wellsae and I. xenon are very similar, each bearing five axial rings. The only substantive differences are that pygidia of I. wellsae are longer relative to their width, and poster pleural and interpleural furrows are slightly less impressed. The species are well differentiated in cephalica for features however, in which I. wellsae differs in the possession of a considerably shorter preglabellar field, much less fiddle-shaped glabella, and a hypostome that appears to lack sculpture, versus a very prominent scrobiculate sculpture in I. xenon.

Material: Holotype, cranidium, ROM 53189 (Pl. 29, fig. 1a-e), from section BH 1 92 m; paratypes ROM 53190-53208, from sections BH 1 164.5-204 m and BHL 1 92 m and localities BHH-A and BHH-C, Cape Phillips Formation, Wenlock (upper Sheinwoodian, Cyrtograptus perneri-Monograptus opinus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Etymology: After Simone Wells.

Interproetus n. sp. A
Pl. 30, figs. 9-12

Discussion: A rare species of Interproetus from mid-Sheinwoodian strata on Baillie-Hamilton Island is clearly differentiated from the slightly younger I. wellsae in its shorter anterior border; more anteriorly tapering glabella; much more anteriorly arcuate preglabellar furrow; more prominent, inflated, anterior and posterior lobes of the eye socle (Pl. 30, fig. 10a); and pygidium with four versus five axial rings.

Material: Assigned specimens ROM 53219-53216, from sections BH 1 112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, Monograptus instrenus-Cyrtograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic.

Interproetus n. sp. B
Pl. 30, figs. 4-7

Discussion: Rare sclerites of Interproetus from the Pseudogerastos rossi fauna near Abbott River are differentiated from I. wellsae. A single fragmentary cranidium from Baillie-Hamilton Island (Pl. 30, fig. 5) is also distinct from the cooccurring I. wellsae in its much shorter and more incised anterior border furrow and more arcuate anterior border. This specimen is tentatively associated with the Abbott River material, which it most resembles, but the only known Abbott River cranidium (Pl. 30, fig. 4) has a considerably shallower anterior border and the Baillie-Hamilton sclerite may represent a very rare third species. The Abbott River material of Interproetus n. sp. B differs from I. wellsae in its shallower anterior border furrow; anterior border that is more arcuate and considerably shorter exsagittally than sagittally; slightly
longer preglabellar field; more arcuate preglabellar furrow; and ibriogenous lateral border with terrace lines developed even more adaxially.

Material: Assigned specimens ROM 53209-53212, from section BH 1 204 m (southern Baillie-Hamilton Island) and section ABR 2 18 m and talus boulders ABR TTC(3) and ABR TTC(5) (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, Cyrtograptus perneri-Monograptus opimus Zone), central Canadian Arctic.

Interproetus n. sp. C
Pl. 30, figs. 13-21

Discussion: Sclerites of Interproetus are quite common in the Mackenziurus deedei fauna, but no cranidia have been recovered. All of the material appears to represent a single new species. Interproetus n. sp. C is distinguished from I. welksae primarily in the possession of a pygidium that is much longer relative to its width and which, as far as can be determined, bears four versus five axial rings.

Material: Assigned specimens ROM 53217-53225, from section BH 2 2-3 m (southern Baillie-Hamilton Island) and section ABR 1 6-9 m (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (lower Homerian, Cyrtograptus undigren-Monograptus testis Zone), central Canadian Arctic.

Interproetus sp.
Pl. 30, fig. 22

Discussion: A fragmentary cranidium has been recovered from section ABR 1 17 m. Some species at this horizon are known to be either conspecific with or exceedingly similar to forms described by Siveter (1989) from western Ireland. Adrain & Chatterton (1994, 1996) have suggested that Siveter’s Conoparia hollandi is a possible junior synonym of Otolacton brauni Perry & Chatterton, 1979, a species which occurs at ABR 1 17 m. An undescribed odontopleurid is also possibly conspecific with Meadowtownella medveda (Siveter). On present evidence, it is possible that the Cape Phillips Formation cranidium is conspecific with I. galvani Siveter, but a great deal more material would obviously be required to properly assess the relationship.

Material: Assigned specimen ROM 53226, from section ABR 1 17 m, Cape Phillips Formation, Wenlock (upper Homerian, Conoparia? lindensis Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic.

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PLATE 1

Fig. 1-8 - *Gerastos mellicshae* n. sp., from sections BH 1 92 m and BH 1 204 m (southern Baillie-Hamilton Island) and talus boulder ABR TTD (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian; Cyrtograptus perneri-Monograptus opimus Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-c - Cephalon, holotype, ROM 52741, dorsal, oblique, anterior, ventral, and left lateral views, x7.5 (BH1 1 92 m).
Fig. 2 a-c - Cephalon, ROM 52742, dorsal, anterior, and oblique views, x7.5 (ABR TTD).
Fig. 3 a-d - Cranidium and left librigena, ROM 52743, dorsal, right lateral, oblique, and anterior views (ABR TTD).
Fig. 4 - Cephalon, ROM 52744, oblique view, x7.5 (ABR TTD).
Fig. 5 a-c - Cranidium, ROM 52745, dorsal, left lateral, and anterior views (ABR TTD).
Fig. 6 a-d - Cranidium, ROM 52746, anterior, dorsal, right lateral, and ventral views (ABR TTD).
Fig. 7 a-b - Hypostome, ROM 52747, ventral and left lateral views (BH 1 204 m).
Fig. 8 - Hypostome, ROM 52748, ventral view (BH 1 92 m).
PLATE 2

Fig. 1-18 - *Gorastos mellishae* n. sp., from section BHL 1 92 m and localities BHH-A and BHH-C (southern Baillie-Hamilton Island) and talus boulder ABR TTD (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus peneri-Monograptus opimus* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-b - Cranidium, ROM 52749, dorsal and left lateral views (BHH-C).
Fig. 2 a-b - Cranidium, ROM 52750, dorsal and left lateral views (ABR TTD).
Fig. 3 a-b - Cranidium, ROM 52751, dorsal and right lateral views (BHH-C).
Fig. 4 - Hypostome, ROM 52752, ventral view (BHL 1 92 m).
Fig. 5 a-b - Hypostome, ROM 52753, ventral and right lateral views (BHH-C).
Fig. 6 - Hypostome, ROM 52754, ventral view (BHH-C).
Fig. 7 - Right librigena, ROM 52755, external view (ABR TTD).
Fig. 8 a-b - Left librigena, ROM 52756, ventrolateral and external views, x7.5 (BHH-C).
Fig. 9 a-b - Left librigena, ROM 52757, external and internal views (ABR TTD).
Fig. 10 - Right librigena, ROM 52758, external view (ABR TTD).
Fig. 11 - Left librigena, ROM 52759, external view (BHH-C).
Fig. 12 a-b - Thoracic segments, ROM 52760, dorsal and right lateral views (BHL 1 92 m).
Fig. 13 a-b - Thoracic segment, ROM 52761, dorsal and anterior views (BHH-A).
Fig. 14 a-c - Thoracic segment, ROM 52762, dorsal, anterior, and right lateral views (BHH-A).
Fig. 15 a-c - Pygidium, ROM 52763, dorsal, left lateral, and posterior views (ABR TTD).
Fig. 16 - Pygidium, ROM 52764, dorsal view (BHH-C).
Fig. 17 - Pygidium, ROM 52765, dorsal view (BHH-C).
Fig. 18 a-b - Pygidium, ROM 52766, dorsal and ventral views (ABR TTD).
Fig. 1-13 - Cerastos fosierue n. sp., from section BHL 1 92 m and locality BHH-C (southern Baillie-Hamilton Island) and talus boulder ABR TTD (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian; Cyrtograptus peroni-Monograptus opinus Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-d - Cephalon, ROM 52767, dorsal, anterior, left lateral, and oblique views, x7.5 (ABR TTD).
Fig. 2 a-b - Cranidium, ROM 52768, dorsal and right lateral views (BHH-C).
Fig. 3 a-e - Cephalon, holotype, ROM 52769, dorsal, right lateral, oblique, ventral, and anterior views (BHL 1 92 m).
Fig. 4 a-b - Hypostome, ROM 52770, ventral and left lateral views (ABR TTD).
Fig. 5 - Hypostome, ROM 52771, ventral view (BHH-C).
Fig. 6 a-c - Cranidium, ROM 52772, dorsal, anterior, and left lateral views (ABR TTD).
Fig. 7 a-b - Cranidium, ROM 52773, dorsal and right lateral views (ABR TTD).
Fig. 8 a-b - Right librigena, ROM 52774, external and ventrolateral views (BHH-C).
Fig. 9 a-b - Cranidium, ROM 52775, dorsal and right lateral views (ABR TTD).
Fig. 10 a-c - Cranidium, ROM 52776, right lateral, dorsal, and anterior views (ABR TTD).
Fig. 11 - Right librigena, ROM 52777, external view (BHH-C).
Fig. 12 - Right librigena, ROM 52778, external view (ABR TTD).
Fig. 13 - Right librigena, ROM 52779, external view (BHH-C).
Gerastos josterae n. sp., from sections BHL 1 92 m and BH 1 164 5 m, and locality BHH-C (southern Baillie-Hamilton Island) and talus boulder ABR TTD (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian; Cyrtograptus peneri-Monograptus opimus Zone), central Canadian Arctic. Magnifications are x10.

Gerastos simus (Lane, 1984), from sections BH 1 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, Monograptus instrenus-Cyrtograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10 except where noted.
Fig. 1-4 - *Gerastos simus* (Lane, 1984), from section BH 1 110 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian; *Monograptus instromenus-Cyrtograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 a-c - Pygidium, ROM 52800, dorsal, posterior, and left lateral views.
Fig. 2 a-d - Pygidium, ROM 52801, ventral, dorsal, posterior, and right lateral views.
Fig. 3 - Pygidium, ROM 52802, dorsal view.
Fig. 4 - Pygidium, ROM 52803, dorsal view.

Fig. 5-18 - *Gerastos monksi* n. sp., from talus boulder ABR 3TT and section ABR 1 5 5-13 5 (near Abbott River, northwestern Cornwallis Island) and section BH 2 3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower to upper Homerian; *Cyrtograptus lundgreni-Monograptus testis* Zone to *Colomograptus? praedefebeli-C? deubeli* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 5 a-b - Cranidium, ROM 52804, dorsal and right lateral views (ABR 3TT).
Fig. 6 - Right librigena, ROM 52805, external view (ABR 3TT).
Fig. 7 - Right librigena, ROM 52806, external view (ABR 3TT).
Fig. 8 a-b - Right librigena, ROM 52807, external and internal views (ABR 3TT).
Fig. 9 - Right librigena, ROM 52808, external view (ABR 1 6 m).
Fig. 10 - Right librigena, ROM 52809, external view (ABR 1 5 5 m).
Fig. 11 - Pygidium, ROM 52810, dorsal view (ABR 1 5 5 m).
Fig. 12 - Pygidium, ROM 52811, dorsal view (ABR 1 6 m).
Fig. 13 - Left librigena, ROM 52812, external view (ABR 1 6 m).
Fig. 14 - Left librigena, ROM 52813, external view (ABR 1 6 m).
Fig. 15 - Pygidium, ROM 52814, dorsal view (BH 2 3 m).
Fig. 16 a-c - Pygidium, holotype, ROM 52815, posterior, dorsal, and ventral views, x7.5 (ABR 3TT).
Fig. 17 - Pygidium, ROM 52816, dorsal view (ABR 1 13.5 m).
Fig. 18 a-b - Pygidium, ROM 52817, dorsal and right lateral views (ABR 3TT).
Fig. 1-15 - Gerastos milleri n. sp., from section ABR 2 27 m and talus boulders ABR TTC(3) and ABR TTC(5), Cape Phillips Formation, Wenlock (upper Sheinwoodian; Cyrtograptus pemeri-Monoograptus opimus Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-d - Cephalon, ROM 52818, dorsal, left lateral, anterior, and oblique views (ABR 2 27 m).
Fig. 2 a-e - Cephalon, holotype, ROM 52819, dorsal, right lateral, ventral, anterior, and oblique views (ABR TTC(3)).
Fig. 3 a-b - Cephalon, ROM 52820, dorsal and left lateral views, x7.5 (ABR 2 27 m).
Fig. 4 - Right librigena, ROM 52821, external view (ABR 2 27 m).
Fig. 5 - Left librigena, ROM 52822, external view (ABR TTC(3)).
Fig. 6 - Right librigena, ROM 52823, external view (ABR TTC(5)).
Fig. 7 a-d - Hypostome, ROM 52824, ventral, dorsal, posterior, and left lateral views (ABR TTC(3)).
Fig. 8 a-d - Pygidium, ROM 52825, dorsal, ventral, posterior, and right lateral views (ABR 2 27 m).
Fig. 9 a-b - Pygidium, ROM 52826, dorsal and ventral views (ABR 2 27 m).
Fig. 10 a-b - Pygidium, ROM 52827, dorsal and posterior views (ABR TTC(3)).
Fig. 11 a-c - Pygidium, ROM 52828, posterior, left lateral, and dorsal views (ABR TTC(3)).
Fig. 12 - Pygidium, ROM 52829, dorsal view (ABR TTC(5)).
Fig. 13 - Pygidium, ROM 52830, dorsal view (ABR 2 27 m).
Fig. 14 - Pygidium, ROM 52831, dorsal view (ABR 2 27 m).
Fig. 15 - Pygidium, ROM 52832, dorsal view (ABR TTC(3)).
Fig. 1-12 - *Gerastos galei* n. sp., from section ABR 2 18 m talus boulders ABR TTC(3) and ABR TTC(5), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus perneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-d - Cranidium, holotype, ROM 52833, dorsal, anterior, ventral, and left lateral views (ABR TTC(3)).
Fig. 2 - Left librigena, ROM 52834, external view (ABR TTC(3)).
Fig. 3 - Cranidium, ROM 52835, dorsal view (ABR TTC(3)).
Fig. 4 - Right librigena, ROM 52836, external view (ABR TTC(3)).
Fig. 5 a-b - Left librigena, ROM 52837, external and internal views (ABR TTC(3)).
Fig. 6 a-c - Thoracic segment, ROM 52838, dorsal, anterior, and right lateral views (ABR TTC(5)).
Fig. 7 a-b - Thoracic segments, ROM 52839, dorsal and anterior views (ABR 2 18 m).
Fig. 8 a-b - Thoracic segment, ROM 52840, anterior and dorsal views (ABR 2 18 m).
Fig. 9 a-b - Thoracic segment, ROM 52841, dorsal and anterior views (ABR 2 18 m).
Fig. 10 a-c - Pygidium, ROM 52842, dorsal, posterior, and right lateral views, x7.5 (ABR 2 18 m).
Fig. 11 a-d - Pygidium, ROM 52843, posterior, dorsal, ventral, and right lateral views (ABR 2 18 m).
Fig. 12 - Pygidium, ROM 52844, dorsal view (ABR TTC(3)).

Fig. 13-14 - *Gerastos sp.*, from talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian; *Cyrtograptus perneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 13 - Pygidium, ROM 52845, dorsal view.
Fig. 14 a-c - Pygidium, ROM 52846, dorsal, posterior, and left lateral views.
Fig. 1-15. *Pseudogerastos forsyi* n. gen. n. sp., from talus boulder ABR TTD (northwestern Cornwallis Island), sections BHL 1 92 m and BH 1 204 m, and locality BHH-C (all southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cynognathus perneri*-*Monograpthus opimus* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-b. Cranidium, ROM 52847, dorsal and right lateral views (ABR TTD).
Fig. 2 a-b. Cranidium, ROM 52848, dorsal and right lateral views, x7.5 (ABR TTD).
Fig. 3 a-c. Cranidium, ROM 52849, dorsal, right lateral, and anterior views (BHL 1 92 m).
Fig. 4 a-b. Cranidium, ROM 52850, dorsal and left lateral views (BHL 1 92 m).
Fig. 5 a-b. Cranidium, ROM 52851, dorsal and left lateral views (ABR TTD).
Fig. 6 a-c. Cranidium, ROM 52852, dorsal, left lateral, and anterior views, x7.5 (ABR TTD).
Fig. 7 a-d. Cranidium, holotype, ROM 52853, dorsal, anterior, left lateral, and ventral views (BHH-C).
Fig. 8 a-b. Cranidium, ROM 52854, dorsal and left lateral views (BHH-C).
Fig. 9 a-b. Cranidium, ROM 52855, dorsal and left lateral views (BHH-C).
Fig. 10 a-b. Cranidium, ROM 52856, dorsal and left lateral views (ABR TTD).
Fig. 11. Right librigena, ROM 52857, external view (BHL 1 92 m).
Fig. 12. Right librigena, ROM 52858, external view (BHL 1 92 m).
Fig. 13. Left librigena, ROM 52859, external view (BHH-C).
Fig. 14 a-b. Hypostome, ROM 52860, left lateral and ventral views (BH 1 204 m).
Fig. 15. Left librigena, ROM 52861, external view (ABR TTD).
Fig. 1-19. *Pseudogerastos fortunei* n. gen. n. sp., from talus boulder ABR TTD (northwestern Cornwallis Island) and section BHL 1 92 m and locality BHH-C (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus permeri-Monograptus opimus* Zone), central Canadian Arctic. Magnifications are x10.

Fig. 1 a-c - Left librigena, ROM 52862, external, internal, and ventrolateral views (ABR TTD).
Fig. 2 a-b - Right librigena, ROM 52863, ventrolateral and external views (BHH-C).
Fig. 3 - Right librigena, ROM 52864, external view (BHH-C).
Fig. 4 - Left librigena, ROM 52865, external view (ABR TTD).
Fig. 5 - Right librigena, ROM 52866, external view (ABR TTD).
Fig. 6 a-b - Thoracic segments, ROM 52867, dorsal and oblique views (BHL 1 92 m).
Fig. 7 a-b - Thoracic segment, ROM 52868, dorsal and anterior view (ABR TTD).
Fig. 8 a-b - Thoracic segment, ROM 52869, dorsal and oblique views (ABR TTD).
Fig. 9 a-c - Thoracic segment, ROM 52870, dorsal, right lateral, and anterior views (BHL 1 92 m).
Fig. 10 a-b - Thoracic segment, ROM 52871, dorsal and anterior views (BHL 1 92 m).
Fig. 11 a-b - Thoracic segment, ROM 52872, oblique and dorsal views (BHL 1 92 m).
Fig. 12 - Thoracic segments, ROM 52873, oblique view (BHL 1 92 m).
Fig. 13 - Pygidium, ROM 52874, dorsal view (ABR TTD).
Fig. 14 - Pygidium, ROM 52875, dorsal view (BHH-C).
Fig. 15 - Pygidium, ROM 52876, dorsal view (BHH-C).
Fig. 16 a-c - Pygidium, ROM 52877, posterior, dorsal, and left lateral views (ABR TTD).
Fig. 17 a-b - Pygidium, ROM 52878, dorsal and posterior views (BHL 1 92 m).
Fig. 18 a-b - Pygidium, ROM 52879, dorsal and postero-dorsal views (BHH-C).
Fig. 19 a-c - Pygidium, ROM 52880, dorsal, ventral, and postero-dorsal views (ABR TTD).
Fig. 1-3 - *Pseudogerastos forfi* n. gen. n. sp., from talus boulder ABR TTD (northwestern Cornwallis Island) and section BHL 1 92 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyriograptus perieri-Monograptus opimus* Zone), central Canadian Arctic.

Fig. 1 a-d - Cranidium and left librigena, ROM 52881, dorsal, oblique, left lateral, and anterior views, x7.5 (ABR TTD).
Fig. 2 a-b - Pygidium, ROM 52882, dorsal and posterior views, x10 (BHL 1 92 m).
Fig. 3 - Pygidium, ROM 52883, dorsal view, x10 (ABR TTD).

Fig. 4-15 - *Pseudogerastos cocksi* n. gen. n. sp., from sections BH 1 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instriatus-Cyriograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 4 a-d - Cranidium, ROM 52884, dorsal, left lateral, anterior, and ventral views (BH 1 110 m).
Fig. 5 - Right librigena, ROM 52885, external view (BH 1 112 m).
Fig. 6 a-b - Thoracic segment, ROM 52886, anterior and dorsal views (BH 1 110 m).
Fig. 7 a-b - Left librigena, ROM 52887, internal and external views (BH 1 110 m).
Fig. 8 - Right librigena, ROM 52888, external view (BH 1 110 m).
Fig. 9 a-b - Right librigena, ROM 52889, external and ventrolateral views (BH 1 110 m).
Fig. 10 - Right librigena, ROM 52890, external view (BH 1 110 m).
Fig. 11 a-b - Right librigena, ROM 52891, internal and external views (BH 1 110 m).
Fig. 12 a-c - Pygidium, holotype, ROM 52892, posterior, dorsal, and left lateral views (BHL 1 0 m).
Fig. 13 a-b - Pygidium, ROM 52893, right lateral and dorsal views (BH 1 110 m).
Fig. 14 - Pygidium, ROM 52894, dorsal view (BH 1 110 m).
Fig. 15 a-b - Pygidium, ROM 52895, dorsal and ventral views (BH 1 110 m).
Fig. 1-16 - *Pseudogerastos rossi* n. gen. n. sp., from section ABR 2 27 m and talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sherwoodian; *Cyrtopterus pomeri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 a.b - Cranidium, ROM 52896, dorsal and left lateral views (ABR TTC(3)).
Fig. 2 a.b - Cranidium, ROM 52897, dorsal and right lateral views (ABR 2 27 m).
Fig. 3 a.b - Cranidium, holotype, ROM 52898, dorsal and right lateral views (ABR 2 27 m).
Fig. 4 a.c - Cranidium, ROM 52899, dorsal, left lateral, and anterior views (ABR 2 27 m).
Fig. 5 a.c - Cranidium, ROM 52900, dorsal, right lateral, and anterior views (ABR TTC(3)).
Fig. 6 a.c - Cranidium, ROM 52901, dorsal, ventral, and right lateral views (ABR TTC(3)).
Fig. 7 a.b - Cranidium, ROM 52902, dorsal and right lateral views (ABR TTC(3)).
Fig. 8 a.b - Cranidium and left librigena, ROM 52903, dorsal and oblique views (ABR TTC(3)).
Fig. 9 - Right librigena, ROM 52904, external view (ABR TTC(3)).
Fig. 10 - Left librigena, ROM 52905, external view (ABR 2 27 m).
Fig. 11 - Left librigena, ROM 52906, external view (ABR TTC(3)).
Fig. 12 - Right librigena, ROM 52907, external view (ABR TTC(3)).
Fig. 13 - Right librigena, ROM 52908, external view (ABR 2 27 m).
Fig. 14 a.b - Right librigena, ROM 52909, external and internal views (ABR TTC(3)).
Fig. 15 - Right librigena, ROM 52910, external view (ABR 2 27 m).
Fig. 16 - Right librigena, ROM 52911, external view (ABR 2 27 m).
PLATE 12

Fig. 1-12. *Pseudogerastos rossi* n. sp., from section ABR 2 27 m and talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (Upper Shalwoodian; *Cyrtograptus perneti-Monograptus optimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 a-b - Thoracic segment, ROM 52912, dorsal and anterior views (ABR TTC(3)).
Fig. 2 a-c - Thoracic segment, ROM 52913, dorsal, anterior, and right lateral views (ABR TTC(3)).
Fig. 3 a-b - Thoracic segment, ROM 52914, dorsal and anterior views (ABR TTC(3)).
Fig. 4 a-b - Thoracic segment, ROM 52915, oblique and dorsal views (ABR 2 27 m).
Fig. 5 a-b - Pygidium, ROM 52916, dorsal and posterodorsal views (ABR TTC(3)).
Fig. 6 a-c - Pygidium, ROM 52917, dorsal, posterior, and left lateral views (ABR 2 27 m).
Fig. 7 a-b - Pygidium, ROM 52918, dorsal and posterior views (ABR 2 27 m).
Fig. 8 a-e - Pygidium, ROM 52919, dorsal, ventral, posterior, posterodorsal, and right lateral views (ABR TTC(3)).
Fig. 9 a-c - Pygidium, ROM 52920, dorsal, ventral, and posterior views (ABR 2 27 m).
Fig. 10 a-b - Pygidium, ROM 52921, dorsal and posterodorsal views (ABR TTC(3)).
Fig. 11 - Pygidium, ROM 52922, dorsal view (ABR TTC(3)).
Fig. 12 - Pygidium, ROM 52923, dorsal view (ABR TTC(3)).

Fig. 13-19. *Pseudogerastos taylori* n. sp., from sections ABR 1 6 m (near Abbott River, northwestern Cornwallis Island) and BH 2 2-3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Homerian; *Cyrtograptus lundgreni-Monograptus testis* Zone), central Canadian Arctic. Magnifications are x10.

Fig. 13 - Thoracic segment, ROM 52924, dorsal view (ABR 1 6 m).
Fig. 14 a-b - Thoracic segment, ROM 52925, anterior and dorsal views (BH 2 3 m).
Fig. 15 a-b - Pygidium, ROM 52926, dorsal and posterior views (ABR 1 6 m).
Fig. 16 a-b - Pygidium, ROM 52927, dorsal and posterior views (BH 2 2 m).
Fig. 17 a-c - Pygidium, ROM 52928, left lateral, dorsal, and ventral views (ABR 1 6 m).
Fig. 18 a-b - Pygidium, ROM 52929, left lateral and dorsal views (BH 2 2 m).
Fig. 19 a-b - Pygidium, ROM 52930, posterior and dorsal views (BH 2 3 m).
Fig. 1-9. *Pseudogerastos taylori* n. sp., from sections ABR 1.5 5.9 m (near Abbott River, northwestern Cornwallis Island) and BH 2.2-3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Hemerian, *Cyrtograptus Lundgreni-Monograptus testis* Zone), central Canadian Arctic. Magnifications are x10.

PLATE 13

Fig. 1 a-c. Cranidium, holotype, ROM 52931, dorsal, left lateral, anterior, oblique, and ventral views (ABR 1.5 5.9 m).

Fig. 2 a-c. Cranidium, ROM 52932, dorsal, left lateral, and anterior views (ABR 1.9 m).

Fig. 3 a-b. Cranidium, ROM 52933, dorsal and right lateral views (ABR 1.6 m).

Fig. 4. Left librigena, ROM 52934, external view (ABR 1.5 5.9 m).

Fig. 5. Right librigena, ROM 52935, external view (ABR 1.5 5.9 m).

Fig. 6 a-b. Right librigena, ROM 52936, external and internal views (BH 2.2 m).

Fig. 7. Right librigena, ROM 52937, external view (ABR 1.5 5.9 m).

Fig. 8 a-c. Pygidium and thoracic segment, ROM 52938, posterior, dorsal, and left lateral views (ABR 1.9 m).

Fig. 9 a-b. Pygidium, ROM 52939, left lateral and dorsal views (BH 2.3 m).
Fig. 1-17 - Hedstroemia charlotteae n. sp., from section ABR 1 22 m, Cape Phillips Formation, Wenlock (upper Homerian, Colonograptus? lindensis Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10 except where noted.

PLATE 15

Fig. 1 - Left librigena, ROM 52955, internal view.
Fig. 2 - Right librigena, ROM 52956, external view.
Fig. 3 a-c - Right librigena, ROM 52957, external, ventrolateral, and internal views, x7.5.
Fig. 4 - Left librigena, ROM 52958, external view.
Fig. 5 - Left librigena, ROM 52959, external view.
Fig. 6 - Left librigena, ROM 52960, external view.
Fig. 7 - Left librigena, ROM 52961, external view.
Fig. 8 - Malformed right librigena, ROM 52962, external view.
Fig. 9 - Malformed right librigena, ROM 52963, external view.
Fig. 10 a-c - Pygidium, ROM 52964, posterior, dorsal, and ventral views, x10, x10, and x7.5.
Fig. 11 a-c - Pygidium, ROM 52965, dorsal, posterior, and left lateral views, x7.5.
Fig. 12 - Pygidium, ROM 52966, dorsal view.
Fig. 13 - Pygidium, ROM 52967, dorsal view.
Fig. 14 - Pygidium, ROM 52968, dorsal view.
Fig. 15 - Pygidium, ROM 52969, dorsal view.
Fig. 16 - Pygidium, ROM 52970, dorsal view.
Fig. 17 - Pygidium, ROM 52971, dorsal view.
Fig. 1-11 - *Hedstroemia wedoni* n. sp., from section ABR 3 24+ m, Cape Phillips Formation, Wenlock (probably upper Homerian, *Colobograptus? ludensis* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-b - Cranidium, ROM 52972, dorsal and right lateral views.
Fig. 2 a-b - Cranidium, ROM 52973, dorsal and left lateral views.
Fig. 3 - Cranidium, ROM 52974, dorsal view.
Fig. 4 - Pygidium, ROM 52975, dorsal view.
Fig. 5 - Left librigena, ROM 52976, external view, x7.5
Fig. 6 - Pygidium, ROM 52977, dorsal view, x7.5.
Fig. 7 a-b - Right librigena, ROM 52978, internal and external views, x7.5.
Fig. 8 - Right librigena, ROM 52979, external view.
Fig. 9 - Left librigena, ROM 52980, external view, x7.5.
Fig. 10 a-b - Pygidium, ROM 52981, dorsal and right lateral views.
Fig. 11 a-c - Pygidium, holotype, ROM 52982, right lateral, dorsal, and posterior views.

Fig. 12-18 - *Hedstroemia* n. sp. A, from sections BH 2 42 m (southern Baillie-Hamilton Island) and ABR 1 30 m (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Ludlow (lower Gorstian, *Lobograptus progenitor* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 12 a-c - Cranidium, ROM 52983, dorsal, left lateral, and anterior views (BH 2 42 m).
Fig. 13 - Right librigena, ROM 52984, external view (BH 2 42 m).
Fig. 14 - Right librigena, ROM 52985, external view (ABR 1 30 m).
Fig. 15 a-c - Pygidium, ROM 52986, dorsal, posterior, and left lateral views (BH 2 42 m).
Fig. 16 - Pygidium, ROM 52987, dorsal view (BH 2 42 m).
Fig. 17 - Right librigena, ROM 52988, external view, x7.5 (ABR 1 30 m).
Fig. 18 a-b - Pygidium, ROM 52989, dorsal and left lateral views (ABR 1 30 m).
Fig. 1-11 - *Thebanaspis morrisi* n. sp., from section BHL 181-92 m and localities BHH-A and BHH-C, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 a-c - Cranidium, holotype, ROM 52990, dorsal, oblique, and left lateral views (BHH-C).  
Fig. 2 a-c - Cranidium, ROM 52991, left lateral, dorsal, and anterior views (BHL 181 m).  
Fig. 3 - Pygidium, ROM 52992, dorsal view (BHH-A).  
Fig. 4 a-d - Pygidium, ROM 52993, dorsal, ventral, left lateral, and posterior views (BHL 192 m).  
Fig. 5 a-c - Right librigena, ROM 52994, external, ventrolateral, and internal views (BHL 192 m).  
Fig. 6 - Left librigena, ROM 52995, external view (BHL 192 m).  
Fig. 7 - Right librigena, ROM 52996, external view (BHH-A).  
Fig. 8 a-b - Pygidium, ROM 52997, posterior and dorsal views (BHH-C).  
Fig. 9 - Pygidium, ROM 52998, dorsal view (BHL 192 m).  
Fig. 10 a-b - Pygidium, ROM 52999, left lateral and dorsal views (BHL 192 m).  
Fig. 11 - Pygidium, ROM 53000, dorsal view (BHH-A).

Fig. 12-18 - *Thebanaspis toddi* n. sp., from talus boulder ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 12 a-c - Cranidium, holotype, ROM 53001, dorsal, oblique, ventral, right lateral, and anterior views.  
Fig. 13 a-b - Left librigena, ROM 53002, external and internal views.  
Fig. 14 - Right librigena, ROM 53003, external view.  
Fig. 15 - Right librigena, ROM 53004, external view.  
Fig. 16 a-c - Pygidium, ROM 53005, dorsal, posterior, and right lateral views.  
Fig. 17 a-b - Pygidium, ROM 53006, posterior and dorsal views.  
Fig. 18 a-d - Pygidium, ROM 53007, left lateral, dorsal, ventral, and posterior views.
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Fig. 1-8 - *Thebanaspis ratai* n. sp., from sections BH 1 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instrenus-Cyrtograptus kolohus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 a-d - Cranidium, holotype, ROM 53008, dorsal, oblique, posteroentral, and right lateral views (BH 1 110 m).

Fig. 2 a-c - Cranidium, ROM 53009, dorsal, anterior, and left lateral views (BH 1 110 m).

Fig. 3 - Left librigena, ROM 53010, external view (BH 1 110 m).

Fig. 4 a-b - Cranidium and thoracic segment, ROM 53011, posterior and dorsal views (BHL 1 0 m).

Fig. 5 a-d - Pygidium, ROM 53012, left lateral, ventral, dorsal, and posterior views (BH 1 110 m).

Fig. 6 a-b - Pygidium, ROM 53013, left lateral and dorsal views (BHL 1 0 m).

Fig. 7 - Pygidium, ROM 53014, dorsal view (BH 1 110 m).

Fig. 8 a-b - Pygidium, ROM 53015, dorsal and posterior views (BH 1 112 m).

Fig. 9-16 - *Thebanaspis welshi* n. sp., from section ABR 1 22 m, Cape Phillips Formation, Wenlock (upper Homerian, *Colonograptus ludensis* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 9 a-e - Cranidium, holotype, ROM 53016, dorsal, oblique, ventral, anterior, and right lateral views.

Fig. 10 a-b - Cranidium, ROM 53017, dorsal and right lateral views.

Fig. 11 a-b - Cranidium, ROM 53018, dorsal and left lateral views.

Fig. 12 - Cranidium, ROM 53019, dorsal view.

Fig. 13 a-b - Left librigena, ROM 53020, internal and external views.

Fig. 14 a-b - Pygidium, ROM 53021, dorsal and posterior views.

Fig. 15 a-b - Pygidium, ROM 53022, dorsal and right lateral views.

Fig. 16 a-c - Pygidium, ROM 53023, dorsal, posterior, and ventral views.

Fig. 17 - *Thebanaspis sp.* 1, from section BHL 1 92 m, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perrieri-Monograptus optimus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Cranidium, ROM 53024, dorsal, anterior, right lateral, and oblique views.
Fig. 1-14 - *Thebanaspis smithi* n. sp., from talus boulder ABR 3TT (near Abbott River, northwestern Cornwallis Island) and section BH 2 2.3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Homerian, *Cyrtograptus Lundgreni-Monograptus testis* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-e - Cephalon, holotype, ROM 53025, dorsal, oblique, ventral, left lateral, and anterior views, x7.5 (ABR 3TT).
Fig. 2 a-d - Cranidium, ROM 53026, dorsal, ventral, left lateral, and anterior views, x7.5 (ABR 3TT).
Fig. 3 a-b - Cranidium, ROM 53027, left lateral and dorsal views (BH 2 2 m).
Fig. 4 - Right librigena, ROM 53028, external view (ABR 3TT).
Fig. 5 - Right librigena, ROM 53029, external view (ABR 3TT).
Fig. 6 - Right librigena, ROM 53030, external view, x7.5 (ABR 3TT).
Fig. 7 a-c - Right librigena, ROM 53031, external, ventrolateral, and internal views, x7.5 (ABR 3TT).
Fig. 8 - Left librigena, ROM 53032, external view (BH 2 2 m).
Fig. 9 - Right librigena, ROM 53033, external view, x7.5 (ABR 3TT).
Fig. 10 a-c - Pygidium, ROM 53034, external, ventrolateral, and internal views, x7.5 (ABR 3TT).
Fig. 11 a-b - Pygidium, ROM 53035, dorsal and ventral views (ABR 3TT).
Fig. 12 - Pygidium, ROM 53036, dorsal view (BH 2 2 m).
Fig. 13 - Pygidium, ROM 53037, dorsal view (ABR 3TT).
Fig. 14 - Pygidium, ROM 53038, dorsal view (ABR 3TT).

Fig. 15-16. *Thebanaspis* sp. 2, from section BH 2 56.5 m, Cape Phillips Formation, Ludlow (lower Gorstian, *Lobograptus progenitor* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Cranidium, ROM 53041, dorsal view, x10.

15. Right librigena, ROM 53039, external view.
16 a-b - Cranidium, ROM 53040, dorsal and right lateral views.

Fig. 17 - *Thebanaspis* sp. 3, from section BH 2 42 m, Cape Phillips Formation, Ludlow (lower Gorstian, *Lobograptus progenitor* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Cranidium, ROM 53041, dorsal view, x10.
Fig. 1-16 - *Thebanaspis jefferyi* n. sp., from section BH 2 3-7.5 m (southern Baillie-Hamilton Island) and section ABR 1 5.5-13.5 m and talus boulder ABR 3TT (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (lower to upper Homerian, *Cyrtogruptus lamgrenti-Monogruptus testis* Zone to *Colonogruptus ludensis* Zone), central Canadian Arctic. Magnifications are x10.

Fig. 1 a-d - Cranidium, ROM 53042, dorsal, ventral, left lateral, and anterior views (BH 2 3 m).
Fig. 2 - Cranidium, ROM 53043, dorsal view (BH 2 7.5 m).
Fig. 3 - Cranidium, ROM 53044, dorsal and ventral views (BH 2 3 m).
Fig. 4 - Right librigena, ROM 53045, external view (ABR 1 5.5 m).
Fig. 5 - Left librigena, ROM 53046, external view (ABR 3TT).
Fig. 6 - Left librigena, ROM 53047, external view (BH 2 3 m).
Fig. 7 a-c - Left librigena, ROM 53048, ventrolateral, external, and internal views (BH 2 3 m).
Fig. 8 - Right librigena, ROM 53049, external view (ABR 1 6 m).
Fig. 9 - Right librigena, ROM 53050, external view (ABR 3TT).
Fig. 10 - Left librigena, ROM 53051, external view (ABR 1 13.5 m).
Fig. 11 - Pygidium, ROM 53052, dorsal view (BH 2 3 m).
Fig. 12 - Pygidium, ROM 53053, dorsal view (ABR 3TT).
Fig. 13 a-b - Pygidium, ROM 53054, posterior and dorsal views (BH 2 3 m).
Fig. 14 a-c - Pygidium, holotype, ROM 53055, dorsal, ventral, and posterior views (BH 2 3 m).
Fig. 15 a-d - Pygidium, ROM 53056, dorsal, ventral, posterior, and left lateral views (BH 2 3 m).
Fig. 16 a-d - Pygidium, ROM 53057, right lateral, dorsal, posterior, and ventral views (ABR 3TT).
Fig. 1-9 - *Westropia benfieldi* n. gca. n. sp., from talus boulders ABR TTD and ABR TTC(3), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cystograptus penneri-Monograptus opimus* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 1-3 - *Craulidium*, holotype, ROM 53058, dorsal, right lateral, and ventral views (ABR TTD).
Fig. 2 a-b - *Craulidium*, ROM 53059, dorsal and ventral views (ABR TTD).
Fig. 4 a-b - Left librigena, ROM 53061, external and internal views (ABR TTD).
Fig. 5 a-b - *Craulidium*, ROM 53062, dorsal and ventral views (ABR TTD).
Fig. 6 a-b - Pygidium, ROM 53063, dorsal and posterior views (ABR TTD).
Fig. 7 - Pygidium, ROM 53064, dorsal view (ABR TTD).
Fig. 8 - *Craulidium*, ROM 53065, dorsal view (ABR TTC(3)).
Fig. 9 a-d - Pygidium, ROM 53066, left lateral, posterior, dorsal, and ventral views.

Fig. 10 - *Westropia* sp., from section BH 1 110 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instrenuus-Cystograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. *Craulidium*, ROM 53067, dorsal view, x10.

Fig. 11-19 - *Westropia skipperae* n. gen. n. sp., from talus boulder ABR 3TT (lower Homerian, *C. lundgreni-Monograptus testis* Zone) and section ABR 1 13.5 m (upper Homerian, *Colongraptus? hadnvii* Zone), Cape Phillips Formation, Wenlock, near Abbott River, northwestern Cornwallis Island. Magnifications are x10.

Fig. 11 a-c - *Craulidium*, ROM 53068, dorsal, right lateral, and anterior views (ABR 3TT).
Fig. 12 a-c - Left librigena, ROM 53069, external, ventrolateral, and internal views (ABR 3TT).
Fig. 13 - Pygidium, ROM 53070, dorsal view (ABR 3TT).
Fig. 14 - Right librigena, ROM 53071, external view (ABR 3TT).
Fig. 15 - Right librigena, ROM 53072, external view (ABR 3TT).
Fig. 16 a-d - Pygidium, holotype, ROM 53073, dorsal, ventral, posterior, and left lateral views (ABR 3TT).
Fig. 17 - Pygidium, ROM 53074, dorsal view (ABR 1 13.5 m).
Fig. 18 a-b - Pygidium, ROM 53075, dorsal and posterior views (ABR 3TT).
Fig. 19 - Pygidium, ROM 53076, dorsal view.

Fig. 20-23 - indeterminate proetid spp., from sections BH 1 110-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instrenuus-Cystograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 20 a-b - *Craulidium*, ROM 53077, dorsal and left lateral views (BH 1 112 m).
Fig. 21 - Right librigena, ROM 53078, external view (BHL 1 0 m).
Fig. 22 - Right librigena, ROM 53079, external view (BH 1 110 m).
Fig. 23 - Right librigena, ROM 53080, external view (BH 1 110 m).
Fig. 1-10 - Winiskia youngi sp., from sections BH 1 109-112 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, Monograptus instrensus-Cyriograptus kolobus Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-c - Cranidium, ROM 53081, dorsal, left lateral, and anterior views, x7.5 (BH 1 109 m).
Fig. 2 a-d - Cephalon, ROM 53082, ventral, posteroventral, dorsal, and anterior views (BH 1 110 m).
Fig. 3 - Right librigena, ROM 53083, external view (BH 1 110 m).
Fig. 4 - Right librigena, ROM 53084, external view (BHL 1 0 m).
Fig. 5 a-b - Right librigena, ROM 53085, external and internal views (BH 1 110 m).
Fig. 6 - Left librigena, ROM 53086, external view (BH 1 110 m).
Fig. 7 a-c - Left librigena, ROM 53087, internal, external, and ventrolateral views (BHL 1 0 m).
Fig. 8 a-d - Cephalon, holotype, ROM 53088, dorsal, anterior, right lateral, and oblique views, x7.5 (BH 1 110 m).
Fig. 9 a-c - Cephalon and thoracic segments, ROM 53089, dorsal thoracic, dorsal cephalic, and right lateral views (BH 1 110 m).
Fig. 10 a-b - Pygidium, ROM 53090, dorsal and ventral views (BH 1 112 m).
FIG. 1-8 - *Winiskia* youngi n. sp., from sections BH 1 110 m and BHL 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instrenuus-Cyrtograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 - Pygidium, ROM 53091, dorsal view (BH 1 110 m).
Fig. 2 - Pygidium and thoracic segments, ROM 53092, ventral view (BH 1 110 m).
Fig. 3 a-c - Thoracic segments, ROM 53093, dorsal, left lateral, and posterior views (BHL 1 0 m).
Fig. 4 a-d - Thoracic segments, ROM 53094, dorsal, right lateral, ventral, and posterior views (BH 1 110 m).
Fig. 5 a-c - Pygidium, ROM 53095, dorsal, posterior, and left lateral views (BHL 1 0 m).
Fig. 6 - Pygidium, ROM 53096, dorsal view (BH 1 110 m).
Fig. 7 - Pygidium and thoracic segments, ROM 53097, dorsal view (BH 1 110 m).
Fig. 8 - Pygidium and thoracic segments, ROM 53098, dorsal view (BH 1 110 m).

Fig. 9-16 - *Winiskia curranti* n. sp., from talus boulder ABR 3TT (near Abbott River, northwestern Cornwallis Island) and section BH 2 3 m (southern Baillie-Hamilton Island), Cape Phillips Formation, Wenlock (lower Homerian, *Cyrtograptus lundgreni-Monograptus testis* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 9 a-d - Cranidium, ROM 53099, dorsal, ventral, right lateral, and anterior views (ABR 3TT).
Fig. 10 a-c - Right librigena, ROM 53100, external, ventrolateral, and internal views, x7.5 (ABR 3TT).
Fig. 11 - Right librigena, ROM 53101, external view (ABR 3TT).
Fig. 12 - Left librigena, ROM 53102, external view (ABR 3TT).
Fig. 13 - Left librigena, ROM 53103, external view, x7.5 (ABR 3TT).
Fig. 14 a-c - Pygidium, ROM 53104, dorsal, ventral, and posterior views (ABR 3TT).
Fig. 15 - Pygidium, ROM 53105, dorsal view (BH 2 3 m).
Fig. 16 a-c - Pygidium, holotype, ROM 53106, left lateral, posterior, and dorsal views, x7.5 (ABR 3TT).
Fig. 17 - Pygidium, ROM 53107, dorsal view (ABR 3TT).
Fig. 1-13 - *Winiskia longbottomae* n. sp., from sections BHL 1 92 m and BH 1 164.5-204 m and locality BHH-C (southern Baillie-Hamilton Island) and section ABR 2 18 m and talus boulders ABR TTD, ABR TTC(3), and ABR TTC(5) (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus pernri-Monograptus opimus* Zone), central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-c - Cranidium, ROM 53108, dorsal, ventral, and left lateral views (ABR TTD)
Fig. 2 a-d - Cranidium, holotype, ROM 53109, dorsal, ventral, right lateral, and oblique views (ABR TTC(3))
Fig. 3 - Right librigena, ROM 53110, external view (BHL 1 92 m).
Fig. 4 a-b - Left librigena, ROM 53111, external and internal views, x7.5 (BHH-C).
Fig. 5 - Left librigena, ROM 53112, external view (BH 1 164.5 m).
Fig. 6 - Left librigena, ROM 53113, external view (ABR TTC(3)).
Fig. 7 - Left librigena, ROM 53114, external view (ABR 2 18 m).
Fig. 8 - Right librigena, ROM 53115, external view (BH 1 204 m).
Fig. 9 - Right librigena, ROM 53116, external view (ABR TTC(3)).
Fig. 10 a-d - Pygidium, ROM 53117, dorsal, posterior, ventral, and right lateral views (ABR TTC(3)).
Fig. 11 - Pygidium, ROM 53118, dorsal view (ABR TTC(3)).
Fig. 12 - Pygidium, ROM 53119, dorsal view (ABR TTD).
Fig. 13 a-b - Pygidium, ROM 53120, posterior and dorsal views (ABR TTC(5)).
Fig. 1-10 - *Conoprostes ellioti* n. sp., from section ABR 1 17-22 m, Cape Phillips Formation, Wenlock (upper Homerian, *Columbograpthus? lutescens* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-e - Cranidium, holotype, ROM 53121, dorsal, right lateral, ventral, oblique, and anterior views (ABR 1 17 m).
Fig. 2 a-d - Cranidium, ROM 53122, dorsal, right lateral, ventral, and anterior views (ABR 1 22 m).
Fig. 3 a-b - Cranidium, ROM 53123, dorsal and left lateral views (ABR 1 17 m).
Fig. 4 a-b - Cranidium, ROM 53124, dorsal and right lateral views (ABR 1 17 m).
Fig. 5 - Right librigena, ROM 53125, external view (ABR 1 17 m).
Fig. 6 a-b - Left librigena, ROM 53126, external and internal views, x7.5 (ABR 1 17 m).
Fig. 7 a-b - Right librigena, ROM 53127, external and ventrolateral views (ABR 1 17 m).
Fig. 8 - Right librigena, ROM 53128, external view (ABR 1 22 m).
Fig. 9 - Right librigena, ROM 53129, external view (ABR 1 22 m).
Fig. 10 - Right librigena, ROM 53130, external view (ABR 1 22 m).
Fig. 1-6, 8 - *Coniproetus elliottiae* n. sp., from section ABR 1 17-22 m, Cape Phillips Formation, Wenlock (upper Homerian, *Colonograpthus? ludensis* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 - Left librigena, ROM 53131, external view (ABR 1 17 m).
Fig. 2 - Left librigena, ROM 53132, external view (ABR 1 22 m).
Fig. 3 a-b - Pygidium, ROM 53133, dorsal and left lateral views (ABR 1 17 m).
Fig. 4 - Thoracic segments, ROM 53134, dorsal view (ABR 1 17 m).
Fig. 5 - Pygidium, ROM 53135, dorsal view (ABR 1 17 m).
Fig. 6 - Pygidium, ROM 53136, dorsal view (ABR 1 22 m).
Fig. 8 a-d - Pygidium, ROM 53137, dorsal, posterior, ventral, and left lateral views, x7.5 (ABR 1 22 m).

Fig. 7, 9-17 - *Coniproetus amphlettae* n. sp., from sections ABR 1 22 m and ABR 3 24+ m, Cape Phillips Formation, Wenlock (upper Homerian, *Colonograpthus? ludensis* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

Fig. 7 - Pygidium, ROM 53138, dorsal view (ABR 1 22 m).
Fig. 9 a-b - Pygidium, ROM 53139, dorsal and posterior views (ABR 1 22 m).
Fig. 10 - Pygidium, ROM 53140, dorsal view (ABR 3 24+ m).
Fig. 11 a-d - Pygidium, ROM 53141, dorsal, ventral, right lateral, and posterior views (ABR 1 22 m).
Fig. 12 - Hypostome, ROM 53142, ventral view (ABR 1 22 m).
Fig. 13 - Hypostome, ROM 53143, ventral view (ABR 1 22 m).
Fig. 14 - Left librigena, ROM 53144, external view (ABR 1 22 m).
Fig. 15 - Left librigena, ROM 53145, external view (ABR 1 22 m).
Fig. 16 - Left librigena, ROM 53146, external view (ABR 1 22 m).
Fig. 17 - Right librigena, ROM 53147, external view (ABR 1 22 m).
Fig. 1-9. *Coniproetus amphlettae* n. sp., from sections ABR 1 22 m and ABR 3 24+ m, Cape Phillips Formation, Wenlock (upper Homerian, *Colonograptus? ludensis* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Magnifications are x10.

- Fig. 1 a-e - Cephalon, ROM 53148, dorsal, ventral, anterior, oblique, and left lateral views (ABR 3 24+ m).
- Fig. 2 a-b - Cranidium, ROM 53149, dorsal and left lateral views (ABR 1 22 m).
- Fig. 3 a-c - Cranidium, ROM 53150, dorsal, ventral, and left lateral views (ABR 1 22 m).
- Fig. 4 a-c - Cranidium, holotype, ROM 53151, dorsal, left lateral, and anterior views (ABR 1 22 m).
- Fig. 5 a-b - Cranidium, ROM 53152, dorsal and left lateral views (ABR 1 22 m).
- Fig. 6 a-b - Cranidium, ROM 53153, dorsal and right lateral views (ABR 1 22 m).
- Fig. 7 a-b - Cranidium, ROM 53154, dorsal and right lateral views (ABR 1 22 m).
- Fig. 8 - Left librigena, ROM 53155, external view (ABR 1 22 m).
- Fig. 9 a-c - Left librigena, ROM 53156, external, ventrolateral, and internal views (ABR 1 22 m).
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Fig. 1-3, 5, 6 - tropidocoryphine sp. 1, from section BHL 1 92 m and locality BHH-A, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus Zone*), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 1 - Cranidium, ROM 53157, dorsal view (BHH-A).
Fig. 2 - Cranidium, ROM 53158, dorsal view (BHL 1 92 m).
Fig. 3 - Left librigena, ROM 53159, external view (BHH-A).
Fig. 5 - Left librigena, ROM 53160, external view (BHH-A).
Fig. 6 - Pygidium, ROM 53161, dorsal view (BHH-A).

Fig. 4, 7 - tropidocoryphineae sp. 3, from section BHL 1 92 m and locality BHH-A, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus Zone*), southern Baillie-Hamilton Island, central Canadian Arctic.

Fig. 4 - Cranidium, ROM 53162, dorsal view, x7.5 (BHH-A).
Fig. 7 - Left librigena, ROM 53163, external view, x10 (BHL 1 92 m).

Fig. 8-11, 13 - tropidocoryphine sp. 2, from locality BHH-A (southern Baillie-Hamilton Island) and talus boulder ABR TTD (northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus Zone*), central Canadian Arctic.

Fig. 8 - Cranidium, ROM 53164, dorsal view, x7.5 (BHH-A).
Fig. 9 - Cranidium, ROM 53165, dorsal view, x10 (BHH-A).
Fig. 10 - Left librigena, ROM 53166, external view, x7.5 (BHH-A).
Fig. 11 - Right librigena, ROM 53167, external view, x10 (ABR TTD).
Fig. 13 - Left librigena, ROM 53168, external view, x10 (ABR TTD).

Fig. 12 - tropidocoryphine sp., from section BHL 1 110 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instreus-Cyrtograptus kolobus Zone*), southern Baillie-Hamilton Island, central Canadian Arctic. Left librigena, ROM 53169, external view, x10.

Fig. 14, 15 - tropidocoryphine sp. or spp., from section BHL 1 92 m, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus Zone*), southern Baillie-Hamilton Island, central Canadian Arctic.

Fig. 14 - Thoracic segment, ROM 53170, dorsal view, x10.
Fig. 15 - Thoracic segment, ROM 53171, dorsal view, x10.

Fig. 16-21 - *Cyphoproetus* n. sp. A, from section BHL 1 110-112, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus instreus-Cyrtograptus kolobus Zone*), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10.

Fig. 16 - Cranidium, ROM 53172, dorsal view (BH 1 112 m).
Fig. 17 - Right librigena, ROM 53173, external view (BH 1 112 m).
Fig. 18 a-c - Left librigena, ROM 53174, external, ventrolateral, and internal views (BH 1 110 m).
Fig. 19 a-b - Pygidium, ROM 53175, dorsal and left lateral views (BH 1 110 m).
Fig. 20 a-b - Pygidium, ROM 53176, dorsal and posterior views (BH 1 110 m).
Fig. 21 - Left librigena, ROM 53177, external view (BH 1 110 m).

Fig. 22-32 - *Cyphoproetus* n. sp. B, from sections BHL 1 92 m and BH 1 204 m, and localities BHH-A and BHH-C (all southern Baillie-Hamilton Island), and section ABR 2 27 m and talus boulder ABR TTC(3) (both near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtograptus perneri-Monograptus opimus Zone*), central Canadian Arctic. All magnifications are x10.

Fig. 22 a-c - Cranidium, ROM 53178, dorsal, anterior, and right lateral views (BH 1 204 m).
Fig. 23 - Cranidium, ROM 53179, dorsal view (BH 1 92 m).
Fig. 24 - Cranidium, ROM 53180, dorsal view (ABR TTC(3)).
Fig. 25 - Cranidium, ROM 53181, dorsal view (BHH-C).
Fig. 26 - Right librigena, ROM 53182, external view (BHH-C).
Fig. 27 - Pygidium, ROM 53183, dorsal view (BH 1 204 m).
Fig. 28 - Left librigena, ROM 53184, external view (BH 1 204 m).
Fig. 29 - Right librigena, ROM 53185, external view (BH 1 204 m).
Fig. 30 - Pygidium, ROM 53186, dorsal view (BHH-C).
Fig. 31 a-c - Pygidium, ROM 53187, dorsal, posterior, and right lateral views (BHH-C).
Fig. 32 - Left librigena, ROM 53188, external view (ABR 2 27 m).
Fig. 1-16. *Interproetus wellsi* n. sp., from sections BHI 1 164.5-204 m and BHL 1 192 m and localities BH-H-A and BH-H-C, Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cystograptus perneti-Monograptus opinus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 1 a-e. Cranidium, holotype, ROM 53189, dorsal, ventral, oblique, right lateral, and anterior views (BHI 1 192 m).
Fig. 2 a-b. Cranidium, ROM 53190, dorsal and right lateral views (BHI 1 204 m).
Fig. 3. Cranidium, ROM 53191, dorsal view (BHI 1 164.5 m).
Fig. 4. Hypostome, ROM 53192, ventral view (BH-H-A).
Fig. 5. Left librigena, ROM 53193, external view, x7.5 (BH-H-C).
Fig. 6. Left librigena, ROM 53194, external view (BH-H-C).
Fig. 7 a-b. Right librigena, ROM 53195, external and internal views (BH-H-A).
Fig. 8. Left librigena, ROM 53196, external view (BH-H-C).
Fig. 9. Left librigena, ROM 53197, external view (BH-H-A).
Fig. 10. Left librigena, ROM 53198, external view, x7.5 (BH-H-A)
Fig. 11 a-d. Thoracic segment, ROM 53199, dorsal, ventral, ventral oblique, and dorsal oblique views (BH-H-A).
Fig. 12 a-b. Thoracic segment, ROM 53200, left lateral and dorsal views (BH-H-A).
Fig. 13 a-c. Pygidium, ROM 53201, dorsal, posterior, and left lateral views, x7.5 (BHI 1 204 m).
Fig. 14. Pygidium, ROM 53202, dorsal view (BHI 1 204 m).
Fig. 15. Pygidium, ROM 53203, dorsal view (BHI 1 204 m).
Fig. 16. Pygidium, ROM 53204, dorsal view, x7.5 (BHI 1 204 m).
Fig. 1-3, 8 - *Interproetus* *wellsae* n. sp., from section BH II 1 204 m and locality BHH-C (southern Baillie-Hamilton Island and talus boulders ABR TTC(3) (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtoograptus peneri-Monograptus opimus* Zone), central Canadian Arctic. Magnifications are x10.

Fig. 1 a-b - Pygidium, ROM 53205, dorsal and posterior views (BH II 1 204 m).
Fig. 2 - Pygidium, ROM 53206, dorsal view (BHH-C).
Fig. 3 - Pygidium, ROM 53207, dorsal view (BHH-C).
Fig. 8 - Pygidium, ROM 53208, dorsal view (ABR TTC(3)).

Fig. 4-7 - *Interproetus* n. sp. B, from section BH II 1 204 m (southern Baillie-Hamilton Island) and section ABR II 2 18 m and talus boulders ABR TTC(3) and ABR TTC(5) (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (upper Sheinwoodian, *Cyrtoograptus peneri-Monograptus opimus* Zone), central Canadian Arctic. Magnifications are x10.

Fig. 4 a-b - Cranidium, ROM 53209, dorsal and left lateral views (ABR II 2 18 m).
Fig. 5 - Cranidium, ROM 53210, dorsal view (BH II 1 204 m).
Fig. 6 - Left librigena, ROM 53211, external view (ABR TTC(3)).
Fig. 7 - Right librigena, ROM 53212, external view (ABR TTC(5)).

Fig. 9-12 - *Interproetus* n. sp. A, from sections BH I 1 112 m and BHI I 1 0 m, Cape Phillips Formation, Wenlock (mid-Sheinwoodian, *Monograptus testatus-Cyrtograptus kolobus* Zone), southern Baillie-Hamilton Island, central Canadian Arctic. Magnifications are x10 except where noted.

Fig. 9 - Cranidium, ROM 53213, dorsal view (BH I 1 112 m).
Fig. 10 a-b - Right librigena, ROM 53214, external and internal views (BHI I 1 0 m).
Fig. 11 - Left librigena, ROM 53215, external view, x7.5 (BH I 1 112 m).
Fig. 12 a-b - Pygidium, ROM 53216, dorsal and posterdorsal views (BH I 1 112 m).

Fig. 13-21 - *Interproetus* n. sp. C, from section BH II 2 2-3 m (southern Baillie-Hamilton Island) and section ABR I 1 6-9 m (near Abbott River, northwestern Cornwallis Island), Cape Phillips Formation, Wenlock (lower Homerian, *Cyrtoograptus lundgreni-Monograptus testalis* Zone), central Canadian Arctic. Magnifications are x10.

Fig. 13 - Right librigena, ROM 53217, external view (BH II 2 3 m).
Fig. 14 - Left librigena, ROM 53218, external view (ABR I 1 9 m).
Fig. 15 a-b - Thoracic segments, ROM 53219, dorsal and anterior views (BH II 2 3 m).
Fig. 16 a-b - Thoracic segments, ROM 53220, dorsal and anterior views (BH II 2 3 m).
Fig. 17 - Left librigena, ROM 53221, external view (BH II 2 3 m).
Fig. 18 - Pygidium, ROM 53222, dorsal view (ABR I 1 9 m).
Fig. 19 - Right librigena, ROM 53223, external view (ABR I 1 6 m).
Fig. 20 - Pygidium, ROM 53224, dorsal view (ABR I 1 6 m).
Fig. 21 - Pygidium, ROM 53225, dorsal view (BH II 2 2 m).

Fig. 22 - *Interproetus* sp., from section ABR I 1 17 m, Cape Phillips Formation, Wenlock (upper Homerian, *Columograptus ludensis* Zone), near Abbott River, northwestern Cornwallis Island, central Canadian Arctic. Cranidium, ROM 53226, dorsal view, x10.


MELVIN M.I. (1897): Landovery graptolite biostratigraphy and paleobiognography, Cape Phillips Formation, Canadian
PROETID TRILLOBITES FROM THE SILURIAN (WENLOCK-LUDLOW) OF THE CAPE PHILLIPS FORMATION


