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Abstract

Kozur, H. and Nassichuk, W.W., A new ostracode genus from Upper Permian Rocks in Arctic Canada; Current Research, Part A, Geol. Surv. Can., Paper 78-1A, p. 389-392, 1978.

Boreokirkbya oertlii n. gen., n. sp. from the Upper Permian Trold Fiord Formation in northern Ellesmere Island is the first Permian ostracode to be described from Arctic Canada. The Trold Fiord Formation on Ellesmere Island has been dated as early Kazanian (Wordian) mainly on the basis of boreal brachiopod assemblages. *Boreokirkbya oertlii* shows affinities with tethyan species and may refine currently ambiguous Upper Permian biostratigraphic relationships between Tethyan and Boreal realms. Mandibular and antennal muscle scars and shell morphology of *Boreokirkbya* indicate that the Kirkbyocopina belongs in the Podocopida.

Introduction

Euryhaline ostracodes are distributed widely in all Permian stages in the Soviet Union and have been employed with particular success, along with certain groups of "small" foraminifers, to subdivide and correlate the Kungurian and Kazanian stages. The latter stages are characterized by lagoonal and marine sediments, evaporites and terrestrial-lagoonal beds; faunas indicative of "normal" marine environments are relatively rare. In North America, however, ostracodes have been employed only secondarily for marine biostratigraphy but hopefully their importance and the importance of other little studied groups such as calcareous foraminifers and conodonts will increase as Permian biostratigraphy becomes increasingly refined. Ostracodes are known to occur only sporadically in most marine Permian rock successions in Arctic Canada and none have been described previously. This paper describes the new kirkbyid genus *Boreokirkbya* which is associated with Boreal faunal elements in the Trold Fiord Formation on Ellesmere Island. The genus is important from a morphological point of view because it displays mandibular and antennal muscle scars which support the view that the suborder Kirkbyocopina does indeed belong in the Order Podocopida as was suggested by Kozur (1972a). Additionally, however, *Boreokirkbya* seems to be related to ostracodes of the Tethyan realm and may ultimately throw new light on currently ambiguous relationships between Upper Permian strata in 'tethyan' and 'boreal' regions.

Stratigraphy and Faunas

The Trold Fiord Formation was defined by Thorsteinsson (1974) as a succession of sandstone, conglomerate and minor limestone deposited rather widely in eastern, southern and northern parts of the Sverdrup Basin. The type section (195 m thick) is on the north side of the Cañon Fiord, northern Ellesmere Island (Thorsteinsson and Tozer, 1971). The formation attains a maximum thickness of about 400 m in the "Sawtooth Mountains" of western Ellesmere Island, approximately 48 km southwest of the type section. The Trold Fiord Formation is equivalent to the Degerbøls Formation, a succession of carbonate rocks in interior regions of the Sverdrup Basin. It is equivalent also to the Tahkandit Formation in Alaska and the Ogilvie Mountains area of the Yukon, and to an unnamed unit of clastic rocks in the Richardson Mountains farther north in the Yukon (Bamber and Waterhouse, 1971).

The ostracode described in this report, *Boreokirkbya oertlii*, was found near the middle of the Trold Fiord Formation, 0.2 km along strike to the north of the type section (Fig. 71.1). There, the formation is 102 m thick. It rests conformably on calcareous sandstones of the Roadian Assistance Formation and is, in turn, overlain by sandstones of the Lower Triassic Bjorne Formation. The Trold Fiord

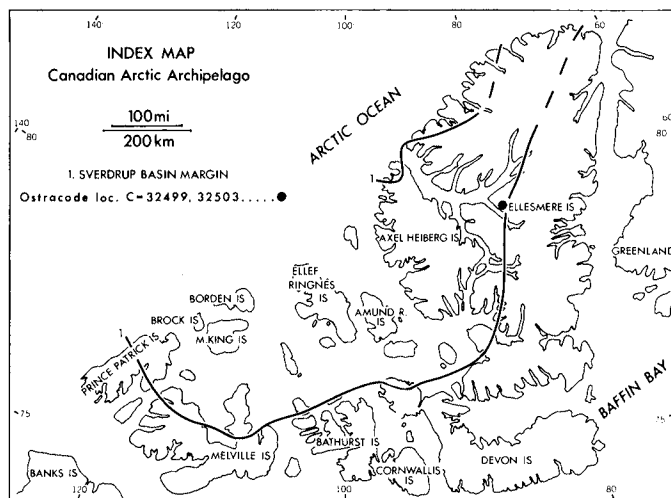


Figure 71.1 Index map showing ostracod occurrences at GSC localities C-32499 and C-32503 in the Upper Permian Trold Fiord Formation.

Formation forms a rather prominent cuesta in the type area and its greenish weathering character is in sharp contrast with yellow- and red-weathering, relatively more resistant sandstone of the overlying Bjorne Formation. The Trold Fiord is composed mainly of fine grained, glauconitic, calcareous sandstones that are thinly bedded with irregular, 'wavy' bedding planes; fine grained chert-pebble conglomerates occur at four levels and minor siltstone and sandy limestone beds occur throughout the formation. Near the middle of the formation, some sandstone beds, which probably are channel deposits, are lenticular, cross-bedded and extensively burrowed. On a regional scale, the Trold Fiord Formation clearly reflects an interval of transgression; progressively older beds are overstepped shoreward. Recurring conglomerates in the type area probably reflect episodes of more rapid transgression rather than local uplift. In terms of a biologically oriented depositional model proposed by Kozur (1972b), deposition probably occurred in water of fluctuating salinity between depths of 10 and 30 m with a moderate to high level of wave energy.

Brachiopods as well as fenestrate and ramose bryozoans occur abundantly throughout the Trold Fiord Formation in the type area; ammonoids, gastropods, pelecypods and solitary corals are relatively rare. Ostracodes described in this report were recovered from residues from glauconitic sandy limestones dissolved in acetic acid. Most specimens are preserved as fragmentary glauconitic steinkerns which are, for the most part, unidentifiable, but a few that are better preserved by

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dolomitization and silicification are identified herein as a new kirkbyid, **Boreokirkbya oertlii** n. gen., n. sp. This, and other unidentified ostracode species are associated with a diverse fauna of calcareous and agglutinated foraminifers, bryozoans and minute, immature gastropods and brachiopods. Representatives of the latter three groups are silicified but foraminifers are preserved as steinkerns. Scales of bony fish and sharks are present also.

Fossils in the Assistance Formation beneath the Troid Fiord Formation north of Cañon Fiord indicate a Roadian age. The ammonoid **Daubichites fortieri** (Harker), which has its type locality in the type section of the Assistance Formation on Devon Island, was identified by Nassichuk (1975) from 43 m above the base of the Assistance directly beneath the type section of the Troid Fiord Formation. Conodonts recovered from this same horizon were identified by Kozur and Nassichuk (1977) as **Gondolella idahoensis** Youngquist, Hawley and Miller and an unnamed species intermediate between **G. idahoensis** and **G. nankingensis** Cheng. Kozur and Nassichuk (ibid.) indicated a late Roadian age; that is latest Chihstian to early Kubergandinian in the Tethyan scale.

The age of the Troid Fiord Formation in the Sverdrup Basin was summarized by Thorsteinsson (1974), who cited brachiopod data provided by R.E. Grant and J.B. Waterhouse, coral data by E.W. Bamber and ammonoid data from Nassichuk et al. (1966) to conclude that the formation is of Guadalupian (Wordian, Capitanian undifferentiated) age. Waterhouse (1976) suggested that brachiopod data from the Troid Fiord throughout the basin indicated the presence of a single zone of early Kazanian (Wordian) age. Waterhouse (in Thorsteinsson, 1974) identified the following brachiopods collected between 18 and 30 m above the base of the type section:

- Thamnosia (Thuleproductus)** n. sp. A
- Spiriferella** sp.
- ?**Kuvelousia sphiva** Waterhouse
- Neospirifer** cf. **N. striatoparadoxus** (Toula)

The following, considerably more diversified brachiopod fauna was identified by Waterhouse (pers. comm., 1971) from near the base of the Troid Fiord Formation nearly 5 km north of the type section.

- Streptorhynchus kempei** Anderson
- Waagenoconcha wimani** Fredericks
- Kuvelousia sphiva** Waterhouse
- Thamnosia** sp.
- Yakovlevia greenlandica** (Dunbar)
- Stenosisma spitzbergiana** (Stepanov)
- Pterospirifer alatus** (Sowerby)
- Spiriferella keilhavii** (von Buch)
- Neospirifer striatoparadoxus** (Toula)

The Troid Fiord ostracode fauna is clearly younger than Roadian ostracode faunas described from Texas by Sohn (1954). It resembles ostracode faunas from the upper Kazanian of the northern Russian Platform and from the lower Zechstein of Germany. Foraminifers in the Troid Fiord appear to indicate close affinities with post-Wordian that is, Capitanian or younger species in Tethyan regions of Germany, Hungary (Bükk Mountains), Yugoslavia and elsewhere. Thus, it is clear that additional studies of foraminifers, ostracodes and also conodonts are required to clarify relationships between the Troid Fiord Formation and sequences in the Urals established largely on the basis of boreal brachiopod assemblages.

Systematic paleontology

Subclass OSTRACODA Latreille, 1806
Superorder PODOCOPAMORPHES Kozur, 1972
Order PODOCOPIDA Sars, 1866
Suborder KIRKBYOCOPINA Gründel,
1969 emend. Kozur, 1972

Remarks

Kozur (1972a) tentatively assigned the Kirkbyocopina to the Podocopida. This assignment was made on the basis of muscle scars in **Scrobicula scrobiculata** Jones, Kirkby and Brady, 1884 as described by Gramm and Pöšner (1972). Those scars, which include adductor muscle and numerous related secondary scars as well as antennal scars, showed that **Scrobicula** clearly is related to the Podocopida. **Scrobicula**, however, had only been assigned tentatively to the Kirkbyocopina and so relationships between the Kirkbyocopina and the Podocopida were known to be speculative. The presence of mandibular and antennal muscle scars and the shell morphology of **Boreokirkbya**, which has all the characteristics of a kirkbyacean ostracode, supports assignment of the Kirkbyocopina to the Podocopida.

Superfamily KIRKBYACEA Ulrich and Bassler, 1906

Family KIRKBYIDAE Ulrich and Bassler, 1906

Genus **Boreokirkbya** n. gen.

Type species

Boreokirkbya oertlii n. sp.

Diagnosis

Large. Carapace elongate rectangular. End margins almost equally round. One broad marginal rim; sometimes a second smaller marginal ridge is developed. Large smooth kirkbyan pit in the midlength. Reticulations of the lateral surface slight; small tubercles present. Rim and ventral surface smooth. Hinge consists of a terminal expanded groove in the left valve and a corresponding ridge and cardinal teeth in the right valve. Mandibular and antennal scars present.

Distribution

Troid Fiord Formation, Arctic Canada.

Included species

Boreokirkbya oertlii n. sp. and **Boreokirkbya** n. sp.

Discussion

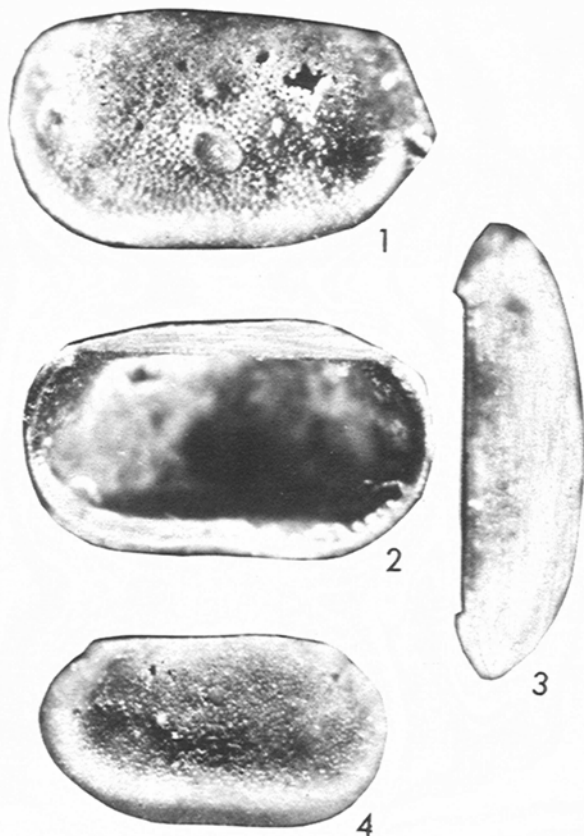
Kirkbya Jones, 1859 has an acute posterior cardinal angle and a proportionately smaller kirkbyan pit. **Knightina** Kellett, 1933 has no terminal teeth. **Knightina? cuetaforma** Sohn, 1954, is similar to the new genus, but possesses 3 marginal ridges, the innermost of which consists of a row of hollow tubes.

Boreokirkbya oertlii n. sp.

Plate 71.1, figures 1-4

Derivatio nominis

In honour of Dr. H.J. Oertli, Pau.



Figures

1. external view of right valve of holotype, GSC 53138, x20.
2. internal view of right valve of holotype, x20.
3. upper view of right valve of holotype, x20.
4. external view of left valve of paratype, GSC 53139, x20.

Plate 71.1 *Boreokirkbya oertlii* n. gen., n. sp. from the Troid Fiord Formation on northern Ellesmere Island (GSC loc. C-32499).

Description

Carapace large, elongate and rectangular in lateral view. Greatest length at mid-height. Dorsal margin straight. End margins almost equally rounded or anterior margin somewhat more broadly rounded. Ventral lateral view straight or slightly concave, ventral margin concave. Broad dorsal area. Posterior slope of shoulder rather steep. Anterior and ventral slopes of shoulder vary somewhat with individuals, but are always considerably less steep than the posterior slope. Lateral surface with small reticulations. Kirkbyan pit large, somewhat rimmed, shallow, reflected on inside of valve as smooth knob. Two small tubercles are situated anterior to the kirkbyan pit. Marginal rim broad and shallow, smooth. Ventral surface also smooth to very faintly pitted. Hinge as for the genus. Groove and corresponding ridge seem to be crenulated, but the state of preservation does not allow a precise description of this crenulation. At the adductor muscle scar, situated in the kirkbyan pit, as well as at the mandibular and antennal muscle scars, secondary scars cannot generally be observed clearly. The mandibular scar, however, probably consists of more than one secondary scar.

Comparisons

A second species, which we have not described because of the fragmentary nature of specimens but which we have designated *Boreokirkbya* n. sp., occurs in association with *Boreokirkbya oertlii*. *Boreokirkbya* n. sp. differs from *B. oertlii* in that the former has a smaller but higher marginal rim and a distinct second marginal ridge between the marginal rim and the margin.

Occurrence

The type locality of *Boreokirkbya oertlii*, GSC locality C-32499, is 43.5 m above the base of the Troid Fiord Formation, north of the Cañon Fiord, northern Ellesmere Island (Lat. 80°43'N, Long. 85°40'W; Textfig. 1). The species is also known to occur slightly higher in the same section in GSC locality C-32503, 49.5 m above the base of the Troid Fiord.

Type specimen

Holotype GSC 53138 and paratype GSC 53139.

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