

Yochelcionella (Mollusca) from the late Middle Cambrian of Bornholm, Denmark

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The mollusc *Yochelcionella* is described from the Andrarum Limestone (late Middle Cambrian) of Øleå, Bornholm, representing the first record of this snorkel-bearing helcionellacean from Balto-Scandia. Its occurrence strengthens the similarity in terms of primitive molluscs between the Middle Cambrian of Bornholm and Australasia.

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Yochelcionella Runnegar & Pojeta 1974 is a small, cap-shaped mollusc characterised by the development of a tube-like extension of the sub-apical wall of the calcareous shell. The tube, termed a 'snorkel' by Runnegar & Jell (1976, p. 115), was considered by the proposing authors to form the locus of the inhalant current to the mantle cavity (see also Pojeta & Runnegar, 1976). In their restoration, the snorkel was located anteriorly above the head, and exhalant streams left the shell posteriorly (Fig. 1A). Geyer (in press), however, has suggested an alternative interpretation, supported by Peel & Yochelson (in press), in which the snorkel is located posteriorly and the snorkel houses the exhalant stream from the mantle cavity (Fig. 1B). All these authors agree

that *Yochelcionella* and other helcionellaceans were untorted molluscs and not torted gastropods as suggested by Knight (1952) and Knight *et al.* (1960).

Yochelcionella was first described from the Middle Cambrian of Australia (Runnegar & Pojeta, 1974; Runnegar & Jell, 1976) but is now known from Lower-Upper Cambrian strata in many parts of the world (Missarzhevsky & Mametov, 1981; Peel, 1980; Pei, 1985; Runnegar & Pojeta, 1980). It is described here for the first time from the Cambrian of Balto-Scandia, but its presence is not unexpected since other molluscan elements of the Middle Cambrian of Bornholm are known to occur together with *Yochelcionella* in strata of similar age in Australasia (Berg-Mad-

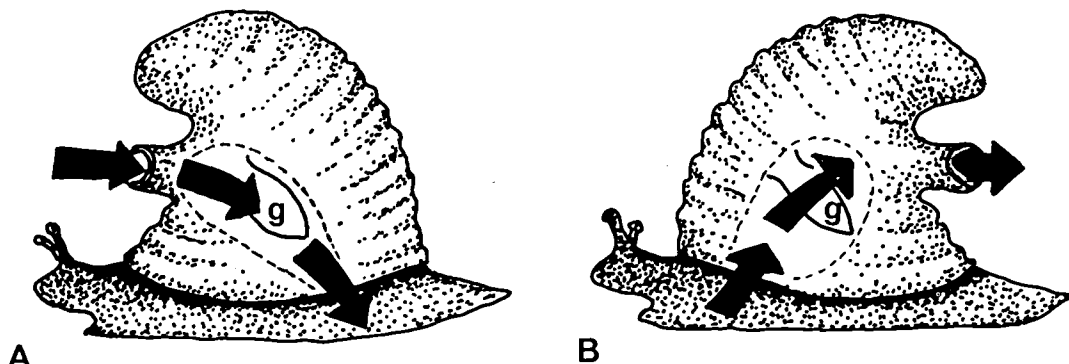


Fig. 1. Alternative reconstructions of water currents (arrowed) in *Yochelcionella*. A, the interpretation favoured by Pojeta & Runnegar (1976) with the anteriorly located snorkel housing the inhalant stream. B, the reconstruction favoured by Geyer (in press) with the posteriorly located snorkel containing the exhalant current (g, gill). Modified after Pojeta & Runnegar (1976, fig. 9).

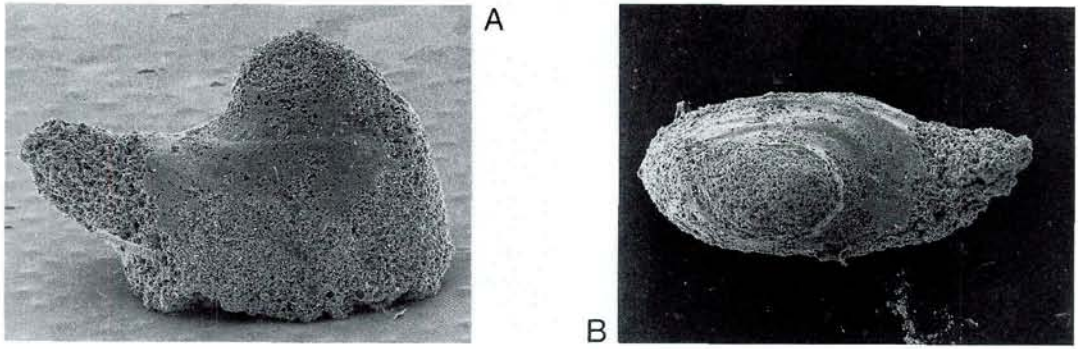


Fig. 2. *Yochelcionella* sp., MGUH 17.510, internal mould, Andrarum Limestone, late Middle Cambrian, Øleå, Bornholm. A, oblique lateral view showing the eroded snorkel (left), $\times 82$; B, dorsal view, with snorkel to the right, $\times 76$.

sen, in press; Berg-Madsen & Peel, 1978; Runnegar & Jell, 1976).

Genus *Yochelcionella* Runnegar & Pojeta, 1974

Type species. *Yochelcionella cyrano* Runnegar & Pojeta, 1974, Coonigan Formation, New South Wales, Australia, early Middle Cambrian.

Discussion. *Yochelcionella* is distinguished from the related *Eotebenna* Runnegar & Jell, 1976 by its tube-like snorkel. In the latter genus, the snorkel is connected to the apertural margin by a narrow slit. A such smaller, tube-like snorkel is present in *Oelandia* Westergård, 1936; this is located near the aperture and not high on the sub-apical wall, as in *Yochelcionella* (Peel & Yochelson, in press).

Yochelcionella sp.

Fig. 2

Material. MGUH 17.510, the only known specimen.

Locality and age. Andrarum Limestone, Øleå, Bornholm, *Solenopleura brachymetopa* Zone, late Middle Cambrian. For further description see Berg-Madsen (1985b).

Description. A poorly preserved internal mould of the apical region of a species of *Yochelcionella*

Runnegar & Pojeta, 1974 with the apertural margin not preserved. Apex worn, but apparently not overhanging. The concave sub-apical surface laterally compressed in dorsal view (Fig. 2B), with length (excluding snorkel) twice the width at the latest preserved growth stage. Lateral areas weakly rugose; a prominent shoulder occurs on the internal mould level with the upper margin of the snorkel (Fig. 2A). Snorkel circular in cross-section, its length not known. Thickness, structure and ornamentation of shell unknown.

Discussion. The specimen was figured without comment by Berg-Madsen (1985a). It is an internal mould of the apical (juvenile) portion of the shell, with its latest preserved growth stage occurring just adapertural of the snorkel. The poor preservation, combined with known ontogenetic variation in some species of *Yochelcionella*, e.g. *Y. ostentata* Runnegar & Jell, 1976, does not permit specific assignment of the specimen from the Andrarum Limestone. Comparison with the well preserved silica replicas of the type material from Australia (Runnegar & Jell, 1976) is difficult on account of the difference in preservation, although the apex appears to overhang the sub-apical surface in the latter material. However, phosphatic moulds from the Middle Cambrian Currant Bush Limestone tentatively assigned to the type species by Runnegar & Jell (1976) show a similarly shaped apex to the Bornholm material.

An overhanging apex is not present in *Yochelcionella ostentata* Runnegar & Jell, 1976, the earlier stages of which closely resemble the specimen from Øleå. The adult of the former species

has a more circular apertural shape (Runnegar & Jell, 1976, fig. 11, C1) but at the same growth stage as the Øleå specimen, the aperture is also approximately twice as long as wide.

Yochelcionella americana Runnegar & Pojeta, 1980, from the Lower Cambrian of Pennsylvania (Runnegar & Pojeta, 1980) and Newfoundland (J. S. Peel, unpublished information) is both more laterally compressed and more strongly coiled. *Yochelcionella stylifera* Missarzhevsky in Missarzhevsky & Mambetov, 1981, from the Lower Cambrian of the Soviet Union is an erect form with strong comarginal rugations. *Yochelcionella chinensis* Pei, 1985, from the Lower Cambrian Xinji Formation of North China, closely resembles the specimen from Bornholm in its degree of lateral compression (Pei, 1985, plate 1, fig. 1c). Rugae are prominent on the internal mould in the Chinese form, but a large collection of a similar form from the Lower Cambrian of Newfoundland indicates that this feature is very variable within the population (J. S. Peel, unpublished information).

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Dansk sammendrag

Yochelcionella sp. (Mollusca) beskrives fra Andrarumkalken ved Øleå på Bornholm. Dette (eneste) eksemplar repræsenterer det hidtil første fund i Skandinavien. Ikke uventet forekommer det i en lagfølge indeholdende faunaelementer identiske med eller lig dem, som forekommer i Australiens Mellem Kambrium, hvorfra typematerialet er beskrevet.

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