REDEscription of the Ordovician Cephalopod genus Centroonoceras Kobayashi, 1934

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INTRODUCTION

The genus Centroonoceras was proposed by Kobayashi (1934) for a Middle Ordovician cyrtoccephalopod from South Korea. The taxonomic position of Centroonoceras has remained ambiguous, however, due to insufficient documentation and illustration of its morphology. The type species, Centroonoceras tokunagai, was originally described by Kobayashi (1927) as a new taxon belonging to the family “Ooceratidae” of the order Oncocerida. When Kobayashi (1934) proposed Centroonoceras, he diagnosed the genus as an orthocerid cephalopod whose closest relationship was with Sactorthoceras Kobayashi, 1934. Flower (1946) later placed Centroonoceras in the family Sactorthoceratidae, an assignment followed by most subsequent workers, including Balashov and Zhuravleva (1962), Sweet (1964), and Chen and Zou (1984). Only Stait (1988) disagreed with Flower’s assignment. He referred Centroonoceras to the family Proteoceratidae with the proviso that “this genus is extremely poorly known.” The purposes of the present report are 1) to clarify the generic concept of this enigmatic genus on the basis of the holotype of the type species and 2) to discuss its assignment.

SYSTEMATIC PALEONTOLOGY

Family Proteoceratidae Flower, 1962
Genus Centroonoceras Kobayashi, 1934


Cyrtoceras Flower, 1939, p. 34. [nomen nudum]

Type species.—Ooceras? tokunagai Kobayashi, 1927.
Other included species.—Orthoceras tyroense Foerste, 1912; Sactorthoceras josephianum Foerste, 1933; Centroonoceras taqupanense Zou and Shen in Chen and Zou, 1984 (C. ejundicam Zou and Shen in Chen and Zou, 1984 may be a junior subjective synonym of this species); Centroonoceras sp. (Flower, 1946, p. 169).

Emended diagnosis.—Moderately expanding cyrtocones with endogastric(?) curvature and circular cross section; apical shell apparently curved, but with curvature reduced in adoral shell; shell surface smooth to ornamented by transverse ridges; sutures usually straight and normal to shell axis; apical siphuncle eccentric (supracentral(?)), shifting with ontogeny to near central; septal necks suborthocoanitic to cyrtochoanitic, connected by globular to fusiform rings; expansion of connecting rings decreases weakly adorally; cameral deposits episephalo-mural; endosiphuncular deposits parietal, forming laminated lining; thickness of lining unequal, thinning at septal foramen.

Occurrence.—In North China, Llanvirn (upper Middle Ordovician) of the Gangwon-Do area in South Korea (Kobayashi, 1927, 1934) and the Ords area in China (Chen and Zou, 1984). In Laurentia, Chazy (upper Middle Ordovician) of the Champlain Valley (Flower, 1946, 1955) and Black River to Rockland (lower Upper Ordovician) of Kentucky (Foerste, 1912; Frey, 1995) in the United States of America, and Black River of Ontario (Foerste, 1932, 1933; Wilson, 1961) and Newfoundland (Stait, 1988) in Canada.

Centroonoceras tokunagai (Kobayashi, 1927)
Figure 1.1–1.8


Diagnosis.—A species of Centroonoceras with an expansion angle of approximately 8° and surface ornamentation of fine transverse ridges; cameral length relatively long, 2.2–4.0 in width/length ratios.

Redescription.—A single imperfect phragmocone is available for study; small cyrtocone of 47.5 mm length with endogastric(?) curvature and circular cross section; shell expansion moderate; shell diameter increases from 4.7 mm (wall on concave side of shell exfoliated) near apical end to 9.4 mm in distance of approximately 34 mm, yielding an angle of expansion of approximately 8°; apical shell apparently curved with a radius of approximately 50 mm, but whose curvature reduces in adoral shell; ridges of surface ornamentation are fine, transverse, and separated by narrow striae; crest of each ridge rounded; shell wall thick for phragmocone size, attaining approximately 0.4 mm; no hyponomic sinus detected; early juvenile shell and body chamber not preserved. Cameral length relatively long for proteoceratids; width/length ratios of camerae range from 2.2 to 4.0; septa shallow, lacking mural part; sutures typically straight, rarely exhibiting shallow dorsal(?) lobes, rectangular to rarely sloped adapical direction on convex side of shell with angle of less than 8° to rectangular plane of shell axis; no septal furrow detected. Apical siphuncle slightly eccentric (supracentral(?)) with siphuncular position ratio (minimum distance of central axis of siphuncle from shell surface per corresponding shell diameter) of approximately 0.4, its position shifting to central during ontogeny; septal necks suborthocoanitic to cyrtochoanitic, 0.24–0.29 mm in length; connecting rings thin and undifferentiated, globular to fusiform; maximum diameter/length ratios of siphuncular segments are 0.6–1.1; expansion of connecting rings slightly stronger on convex side of shell (as dorsal inflation?) in some camerae, and weakly decreasing adorally. Cameral deposits well developed, episephalo-mural, forming circumsiphuncular ridges with mammiform growth; endosiphuncular deposits restricted to apical siphuncle, parietal, and forming laminated thick lining on both ventral and dorsal siphuncular wall; thickness of lining unequal and thinning down at septal foramen, thus its surface usually linear in profile in longitudinal section; voids of endosiphuncular deposits form canal-like tube, approximately 0.12 mm in diameter, at central axis of apical siphuncle.

Material examined.—Holotype, UMMT PM0052, University Museum of the University of Tokyo.

Occurrence.—Centroonoceras tokunagai was collected from the Llanvirn (=Darriwilian) shale of the Jigunsan Formation at Maggol (=Makkol in Kobayashi, 1927, 1934), Yeongwol-gun,