62. Ordovician Cephalopods in Hwangho Basin, Eastern Asia

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In geology of Eastern Asia the Tsinling-Seoul (Keijo) line is the biogeographic boundary of prime importance. In the Ordovician period the northern fauna was intimately related to the Arcto-American fauna, while the southern fauna reveals close affinity to the European-Australian one, as pointed out in 1930. The northern area covering North China, South Manchuria and North Korea was called “Hwangho basin” (1943).

In the Taitzuho region, South Manchuria, three stages of cephalopod evolution in the Ordovician period were distinguished, namely the Wanwanian ellesmeroceroid age, the Wolungian piloceroid (better to say, manchuroceroid) age and the Toufangian actinoceroid age (1931a). Recently a larger part of the Wanwanian cephalopods (1933) was found late Upper Cambrian age (Chen and Teichert, 1983). While the siphuncular bulb is well developed among the Cambrian ellesmeroceroids, it is absent in the basal Ordovician ones. Ectenolites is a survivor in the Yehli formation at Luan-hsien, Hobei (Obata, 1940). The Yehli fauna is now amplified with eight genera including three new genera. Among Anguloceras, Cumberloceras, Dakeoceras, Woosteroceras and Barnesoceras from the Taihang Mountains, last four genera warrant the Gasconadian age of this fauna (Chen et al., 1980). These genera belong to either the Ellesmeroceratidae or the Bassleroceratidae in the Ellesmeroceratida except for Proterocameroceratina of the Proterocameroceratidae in the Endoceratida.

The occurrence of “Ellesmeroceras” cf. elongatum together with Archaeoscyphia chihliensis at Sangok-myeon near Koweon, North Korea indicates the transition from Wanwanian to Wolungian (1931b). The typical Wolungian cephalopods of the Hwangho basin are Manchuroceras, Coreanoceras, Chihlioceras and Parapiloceras whose siphuncle is highly complicated by organic deposits, usually thick on the ventral side. A unique phragmacone of Coreanoceras kemipoense’s conch (pl. 8, fig. 1, 1931b) shows that septal distance is very short; camerate portion occupies about a half of shell diameter and contains no deposit. Hence the part is easily destructive. Hardmanoceras is an important associate for interprovincial correlation. The fauna is approximately correlated to the middle-late Canadian (Chen et al., 1980).

Various actinoceroids constitute the dominant group of the Middle Ordovician Toufangian fauna in which subgroups can be distinguished. Polydesmia and Ordosoceras of the Polydesmiidae are two keys to the Maruyaman fauna which corresponds to the Whiteriverian one (1940, 1977). Remarkably enough, their siphuncles reveal double structure of outer nummuli and inner sheathes. They are accompanied by Wutinoceras which is an armenceroid appeared slightly earlier at the transition from Wolungian to Toufangian. Another associate is Stereoplasmoceras which appeared simultaneously or even a little earlier and survived through the Toufangian age.

The Maruyaman fauna was succeeded by the so-called Machiakou fauna by
Grabau (1922) in which different species of Armenoceras and Ormoceras have appeared and disappeared one after another. Discoactinoceras and Tofangoceras are common in the later stage. Gonioceras is one of the latests whose age is Trentonian.

Thus actinoceroids constitute the main group of the Toufangian cephalopods. Their conchs are mostly orthocones and Cyrtactinoceras is an exception. The siphuncle varies in size. It is narrow and subcentral in Ormoceras. In eury- siphonate ones the siphuncle is submarginal on the ventral side. Armenoceras is the leading member whose siphuncle is large. Not only nummuli but also intracamerline deposits are well developed.

Judging from the shell structure manchuroceroids as well as eurysiphonate actinoceroids are quite unsuitable for quick motion and presumably incapable of swimming. In view of their heavy shells, the former was a vagile benthos and the latter a sluggish vagile benthos. In other words they were brought to birth by benthonic adaptation.

Manchuroceras, Parapiloceras and Hardmanoceras occur at Daiyangsha and Armenoceras, Ormoceras and Tofangoceras at Wangou, both in Hunjiang region, Jilin (Liang, 1981), and Armenoceras at Shuo-hsien (1941) and Ectenoceras, Coreanoceras and Discoactinoceras in three horizons at Qingshuhei near Shansi-he, Inner Mongolian border (Zou, 1981). These occurrences define the eastern and western limits of the Hwango basin. Gypsum deposits are found in the Toufangian formation around Taiyuan. Central Shansi are considered evaporites in shallow lagoon or embayment in the western margin of the Hwangho basin (Obata, 1940). Thus “Ordos” land or island is assumable out of the facts.

In Zuoxi Mountain (Chaotzushan), West Ordos are distinguished in six zones, namely Pseudowutinoceras (1), Parakogenoceras (2), Polydesmia (3), Ordosoceras (4), Pompoceras-Dideroceras (5) and Eurasiatoticeras-Sheshanoceras (6) zones among which the 3 and 4 zones are Maruyaman and the 6 assemblage is upper Trentonian. The Liulinoceras-Kotoceras and Teichertoceras-Westonoceras assemblages are known from Yaoxian district, Shaanxi, where the former is correlated to the Chikunsan fauna of South Korea and the latter is upper Trentonian in age (Chen and Zou, 1984).

In the Kilianshan to the west four horizons containing (1) Manchuroceras and Wutinoceras, (2) Wutinoceras, Armenoceras etc., (3) Wutinoceras, Linormoceras etc. and (4) Discoceras verbeekii are reported (Chang, 1965). Sigmorthoceras, Wutinoceras, Discoceras and Rynchorhorthoceras are found in the Mt. Altun area on the Qinghai and Xijiang border (Lai and Wang, 1986). In further west in Tienshan the Sinoceras rudum limestone and the S. chinense limestone were found in the Saergan series of Kelpin (Chang et al., 1959). Now various Ordovician cephalopods are reported from different horizons in Xijiang among which the oldest is Ellesmeroceras holmi. Didiceroceras, Chisiloceras, Michelino- ceras and Steroplasmoceras belong to the second group and Trocholites, Discoceras, Sinoceras chinense and so forth are in the third group. These cephalopods of the trans-Ordos and Xijiang regions show as a whole the mixing of the Hwangho and Yangtze faunas and become stronger in the latter region.

Finally it is noted that Discoceras, Nybyoceras and Troedsonneceras occur in Upper Ordovician rocks in Kazakstan (Barskov, 1972), although little as yet known of Palaeozoic cephalopods of Mongolia. Upper Ordovician ones were found there recently but undescribed (Zhuravleva, 1978).
References

Barskov, I. S. (1972): Late Ordovician and Silurian cephalopod molluscs of Kazakstan and Middle Asia. 94 pp., 12 pls.


Chen Junyuan et al. (1980): Ordovician sediments and faunas in the Taihang Mountains, North China. ibid., no. 16, pp. 111-152, 6 pls.


