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SOME ORDOVICIAN GASTROPODS FROM THE MUN'GYŎNG OR BUNKEI DISTRICT, SOUTH KOREA*

The Cambro-Ordovician Formations and Faunas of
South Korea Part V

By

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With Plate V

Ordovician fossils are exceedingly rare in the Tan'gyang (Tanyo) and Mun'gyŏng districts in the southern part of the Kangwŏn-do (Kogendo) limestone plateau, but SHIRAKI's collection from the latter district contains some gastropods, besides a few indeterminable bryozoans, brachiopods, pelecypods and cephalopods. They were collected by his assistant from dolomitic limestone of the Todon formation at Loc. Kan (咸下), on a small hill northeast of Tot'am-ni, Kaun-myŏn, Mun'gyŏng-kun, Kyŏngsang-bukto, South Korea.**

Seven species of gastropods are distinguished among them as follows:

1. "*Bellerophon*" *aotii* KOBAYASHI, new species
2. *Scalites katoi* (KOBAYASHI)
3. *Scalites irregulare* KOBAYASHI, new species
4. *Helicotoma amanoi* KOBAYASHI, new species
5. *Palaeomphalus keizanensis* (KOBAYASHI)
6. *Lophospira* cfr. *bantatsuensis* KOBAYASHI
7. *Liospira shohakuensis* KOBAYASHI

Because the second, fifth and last species are all known from the Tsuibon limestone, the fossiliferous dolomitic limestone is undoubtedly the correlative of the Tsuibon limestone. These seven species of gastropods are described in this paper. On this occasion *Oxynodiscus sigmoidalis* and *Bucania katoi* are transferred respectively to *Joleandella* and *Loxobucania*.

Superfamily Bellerophontacea

Family Bucaniidae

Genus *Joleandella* PATTE, 1929

Joleandella sigmoidalis (KOBAYASHI)

1934. *Oxynodiscus sigmoidalis* KOBAYASHI, *Jour. Fac. Sci. Imp. Univ. Tokyo*, Sect. 2, Vol. 3, Pt. 8, p. 361, pl. 5, figs. 8-9.

This species agrees with *Oxydiscus* (*Joleandella*) *mansuyi* PATTE (1929, p. 55, pl. 6, figs. 5a-f) in the discoidal shell, especially compressed in the outer side, narrow umbilicus and sigmoidal ornamentation. From these agreements they are

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considered to belong to the same genus. Whether this has a slit-band or not is indeterminable. Its presence is not warranted in PATTE's species either.

His species was procured from *les schistes de Ban Hom, Tonkin*, Indochina, which is presumed either Gotlandian or Devonian. It differs from the Korean species in the coarser ribs which are tuberculate or broken into tubercles and much more widely spaced.

Incidentally, *Oxydiscus* KOKEN, 1889, is according to KNIGHT (1941, pp. 223 & 361), a synonym of *Tropidodiscus* MEEK and WORTHEN 1866. Radial ribs are remarkably sigmoidal in these species of *Joleandella*, but neither in *T. curvilineatus* (CONRAD) nor in *T. imitator* (KOKEN).

Occurrence:—Chikunsan shale at Makkol.

Genus *Loxobucania* KNIGHT, 1942

Loxobucania katoi (KOBAYASHI)

1930. *Bucania katoi* KOBAYASHI, *Japan, Jour. Geol. Geogr.* Vol. 7, p. 87, pl. 8, figs. 6a-c.

KNIGHT erected *Loxobucania* for *Bucania* having ornamentation revolving linear features running normal to the apertural margin and converging upon the slit and selenizone, generally interrupted by growth lamellae. The type specimen is *Bellerophon lindsleyi* SAFFORD to which *B. katoi* agrees in the ornamentation.

Occurrence:—Unkanu Bed; Taesong-ni, Mandal-myŏn, Kangtong-gun, P'yŏngan-namdo, North Korea. (平安南道江東郡晩達面大成里)

Family Bellerophontidae

Genus *Bellerophon* MONTFORT, 1808

"*Bellerophon*" *aotii* KOBAYASHI, new species

Plate V, Figures 1a-b

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Description:—Shell small, somewhat globular; spire expanding rapidly; whorl subtriangular in cross section; lateral wall moderately convex, meets with the other wall to form a salient keel on dorsum; umbilicus closed or very small and deep, if opened; aperture scarcely flared. Radial ribs on lateral wall arcuate with forward convexity and abruptly swinging back near keel to form a slit; intervals depressed and much broader than ribs; spiral riblets on the intervals forming small nodes with ribs.

Comparison:—This belongs to REED's *Fissidorsata*. In the surface sculpture and prominent dorsal carination this species resembles *Cyrtolites lamellifer* LINDSTRÖM (1884, p. 82, pl. 6, figs. 31-38) which is the type of *Temnodiscus* KOKEN, 1896, (KOKEN and PERNER, 1925) and also *Temnodiscus salopiniensis* REED (1921, p. 51, pl. 9, fig. 10), but these species of *Temnodiscus* have evolute shells, while this is very involute. In the close coiling of the spire and the broad whorl section it is more similar to *Bellerophon* and even *Pharkidonotus* Girty, 1912, although the last genus has no slit-band. This will turn out a new genus, when a better specimen is procured.

Occurrence:—Kan.

Superfamily Pleurotomaricea

Family Raphistomatidae

Subfamily Raphistominae

Genus *Raphistoma* HALL, 1847

Raphistoma coreanicum KOBAYASHI fits in *Raphistoma* HALL in the essential features, the type of which is *Maclurea striatus* EMMONS. *R. keizanensis* is on the other hand better placed in *Phalaeomphalus* KOKEN. As noted already, *R. katoi* is a scalitoid, although the spire is much lower in it than in *Scalites angulatus* EMMONS, the type of *Scalites* EMMONS, or even in *Scalitina montana* SPIESTERBACH, the type of *Scalitina* SPIESTERBACH.

Genus *Scalites* EMMONS 1842*Scalites katoi* (KOBAYASHI)

Plate V, Figures 4a-b

1934. *Raphistoma katoi* KOBAYASHI, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sect. 2, Vol. 3, Pt. 8*, p. 373, pl. 8, figs. 4-16.

This is a common species among the Todorri gastropods, but none shows growth lines. The closest ally to this species is *R. himalaicum* REED which is another scalitoid.

Occurrence:—Kan; Tsuibon beds at Makkol, Saishori and Dotenri.

Scalites irregulare KOBAYASHI, new species

Plate V, Figures 5a-b

This differs from the preceding principally in the abrupt descent of the last half volution. Accordingly the periphery of this volution forms an angle of about 24 degrees with that of the preceding volution in the lateral view. It is also noteworthy that there is a shallow concavity below the peripheral angulation, where the growth lines are inclined forward, but they become subvertical on the outer wall below the constriction. The upper wall is flat and the peripheral band occupies a quarter of the upper wall where the apertural margin forms a slit.

The specimen is 3.3 cm. in height and breadth; the upper or outer wall is respectively 8.5 mm. or 19 mm. wide at the aperture. A specimen of *S. katoi* from the same locality is about the same size, but the coiling is regular through the whorl spire.

Occurrence:—Kan.

Subfamily Helicotominae

Genus *Helicotoma* SALTER, 1895*Helicotoma amanoi* KOBAYASHI, new species

Plate V, Figures 5a-b, 6a-b

Spire low, composed of 5 or more volutions; early whorls flat-topped, but in the last whorl the upper wall becomes concave and its periphery is well developed into a prominent keel. The lateral wall is subvertical, but gradually inclined inward and forms an obtuse angle with the umbilical wall. The umbilicus is narrower than two-fifths of the diameter. Growth striae on the upper and outer walls are bent back toward the keel to form sinuation.

The holotype in figs. 6a-b is 3.3 cm. across and 2.2 cm. high. The last whorl is 1.8 cm. high or 1.6 cm. high between the basal angulation and the keel or the upper wall of the whorl respectively. The whorl measures 12.5 mm. between the inner suture and outer wall.

This species has the collar along the periphery as commonly seen in *Helicotoma*, but the whorl and the spire also are much taller than usual in *Helicotoma*.

Occurrence:—Kan.

Genus *Palaeomphalus* KOKEN, 1925
Palaeomphalus keizanensis (KOBAYASHI) ✓

Plate V, Figures 8a-b, 9a-b

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1934. *Raphistoma keizanensis* KOBAYASHI, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sect. 2, Vol. 3, Pt. 8*, p. 372, pl. 7, figs. 1-7, 14.

A specimen in figs. 8a-b is 4.5 cm. across and composed of more than 5 volutions. The spire, about 2.3 cm. high, is terraced with horizontal upper walls. The lateral and umbilical walls meet to form a blunt angle. The umbilicus thus outlined is a little shorter than the diameter.

The umbilicus is narrower and deeper and the basal carina more pronounced in another specimen in figs. 9a-b. In this specimen the peripheral band is distinctly elevated near the aperture, but it is not collar-shaped. It is clearly seen on the upper and lateral walls that growth lines swing back toward the band.

The low spire, flat horizontal upper walls and the aspects of the peripheral bands suggest *Palaeomphalus* for the proper position of this species. The spire is, however, more rapidly expanding in this species than in *P. gradatus* (KOKEN).

Occurrence:—Kan; Tsuibon beds of Keizanson, Makkol and Saishori.

Family Pleurotomariidae

Subfamily Lophospirinae

Genus *Lophospira* WHITFIELD, 1886

Remarks:—Among 8 species of *Lophospira* which ENDO described from South Manchuria in 1934, *L. elegans*, *L. inconsueta* and *L. tenuis* are all quite distinct from the already known species from Eastern Asia. *L. similator* is, however, so similar to *L. (Pagodispira) tetracarina* that they appear to me to belong to an identical species. *L. yabei* and *L. minuta* look very much like *L. morrisi* and *L. grabaui* respectively. I fear that *L. compressa* and *L. ozakii* are deformed *L. subpulchellus*. The older species of Eastern Asia have already been discussed in 1934.

Lophospira cfr. *bantatsuensis* KOBAYASHI

Plate V, Figure 3

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1930. cfr. *Lophospira bantatsuensis* KOBAYASHI, *Japan. Jour. Geol. Geogr.* Vol. 7, p. 88, pl. 9, figs. 4-5.

Because the shell is compressed laterally and somewhat obliquely, the apical angle measures 68 or 82 degrees in a way or another. An upper whorl is embraced by a lower one as much as seen in the specimen in fig. 4, pl. 9, 1930. The marginal carina is trilineate and protruded; lateral wall very steeply inclined, somewhat concave and separated from the lower wall by an obtuse angulation.

Aperture and umbilicus unknown.

This resembles *L. morrissi* GRABAU, but the lateral wall is more inclined in that species. In the subvertical lateral wall, it is similar to *L. endoi* KOBAYASHI, but the apical angle is larger and the spire growing more rapidly in this species.

Occurrence:—Kan.

Subfamily Eotomariinae

Genus *Liospira* ULRICH and SCOFIELD, 1897

Liospira shohakuensis KOBAYASHI

Plate V, Figures 2a-c

1934. *Liospira shohakuensis* KOBAYASHI, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sect. 2, Vol. 3, Pt. 8*, p. 368, pl. 7, figs. 12-13, 15-16.

A Steinkern agrees with the holotype of this species except the peripheral angulation which is somewhat more rounded in the Saishori specimen.

Occurrence:—Kan; Tsuibon beds at Saishori.

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Explanation of Plate V

" <i>Bellerophon</i> " <i>aotii</i> KOBAYASHI, new species	p. 86
Figures 1a-b. Dorsal and lateral views. $\times 1.5$.	
<i>Liospira shohakuensis</i> KOBAYASHI.....	p. 89
Figures 2a-c. Lateral, apical and dorsal views. $\times 2$.	
<i>Lophospira</i> cfr. <i>bantatsuensis</i> KOBAYASHI.....	p. 88
Figures 3. Lateral view. $\times 1.5$.	
<i>Scalites katoi</i> (KOBAYASHI)	p. 87
Figures 4a-c. Apical and lateral views. $\times 1$.	
<i>Helicotoma amanoi</i> KOBAYASHI, new species	p. 87
Figures 5a-b. Apical and lateral views. $\times 1$.	
Figures 6a-b. Oblique-lateral and apical views. $\times 1$.	
<i>Scalites irregulare</i> KOBAYASHI, new species.....	p. 87
Figures 7a-b. Apical and lateral views. $\times 1$.	
<i>Palaeomphalus keizanensis</i> (KOBAYASHI).....	p. 88
Figures 8a-b. Apical and lateral views. $\times 1$.	
Figures 9a-b. Apical and umbilical views. $\times 1$.	

All specimens collected from Loc. Kan. (咸下), Northeast of Tot'am-ni, Kaun-myŏn, Mun'gyŏng County, Kyŏngsang-Bukto, South Korea (慶尙北道開慶郡加恩面都春里北東方) and stored in the Geological Institute, University of Tokyo.