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LINGULA ANATINA LAMARCK FROM MUTSU BAY,
NORTHERN JAPAN¹⁾

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A large collection of *Lingula* specimens, previously described as *Lingula nipponica* HAYASAKA, 1931, has been sampled at Asamushi, Northern Japan. A redescription is given and the characteristics are compared with those of *Lingula anatina* LAMARCK and *L. reevei* DAVIDSON. The specimens belong to *L. anatina* and the name *L. nipponica* has to be considered as synonym of the former species.

A large collection of *Lingula* specimens has been sampled at several stations in the vicinity of Asamushi (Fig. 1; TSUCHIYA and EMIG, 1983). Previously HAYASAKA (1931, 1932) described this material which consisted of only three specimens, collected from three locations in Mutsu Bay (Fig. 1) and therefore he created a new species named *Lingula nipponica*. HAYASAKA (1932) wrote that his specimens "have almost all the characteristics in common with *L. unguis*" (= *Lingula anatina*; cf. EMIG, 1982): "the only point of difference is in the outline of the shell, ..".

In the present paper, a redescription of specimens from Mutsu Bay is provided on the bases of the taxonomic characters established by EMIG (1982) and the characteristics of those specimens are compared with the nearest other *Lingula* species, i.e. *Lingula anatina* LAMARCK and *L. reevei* DAVIDSON.

DESCRIPTION OF THE SPECIMENS FROM ASAMUSHI

SHELL

The shell is oblong-elongate (Fig. 4a, 4c), has nearly straight or subparallel lateral margins, and gently convex to straight anterior edge with a median projection hardly recognizable. The external surface of the shell is smooth but growth lines are slightly indicated.

Even the use of morphometric characters has no significant taxonomic value, width/length ratios have been established on 9 specimens, ranging from 22.5 to 38.5

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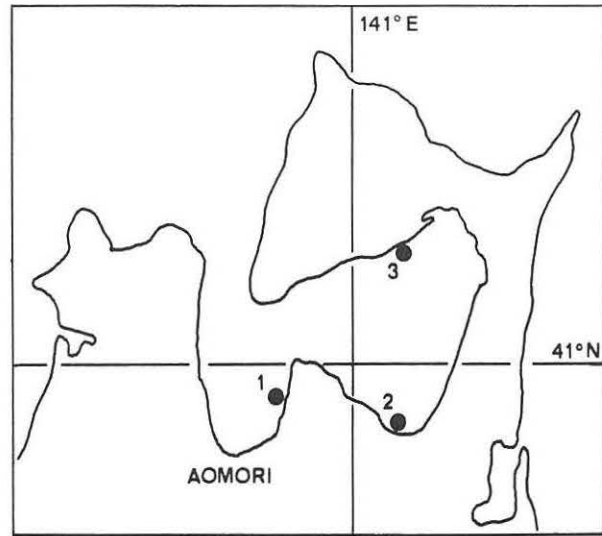


Fig. 1. Localities at which *Lingula anatina* has been found in Mutsu Bay: our own samples at Asamushi (1) and recording of HAYASAKA (1932) off Gomejima (1), off Noheji (2), and off Tozawa (3).

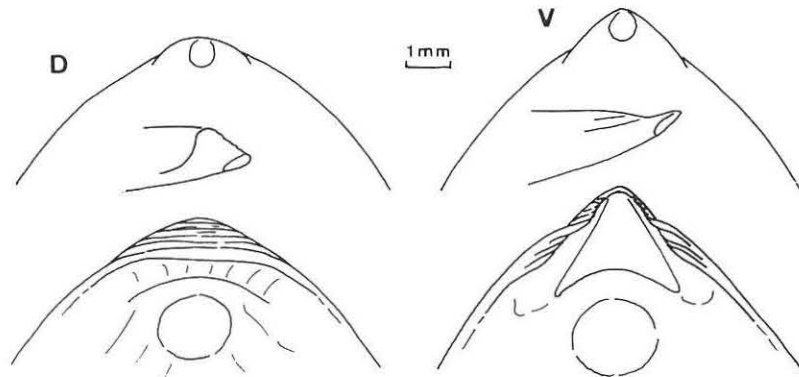


Fig. 2. Umbonal regions of the specimens from Asamushi: exterior, interior and section views of a dorsal (D) and ventral (V) valve.

Table 1.
Length (L) and width (w) measurements and w/L ratios of the ventral valve of 9 specimens from Asamushi

	Range	Mean
L (in mm)	22.5 - 38.5	31.4
w (in mm)	10 - 16.5	13.6
w/L	0.419- 0.448	0.433

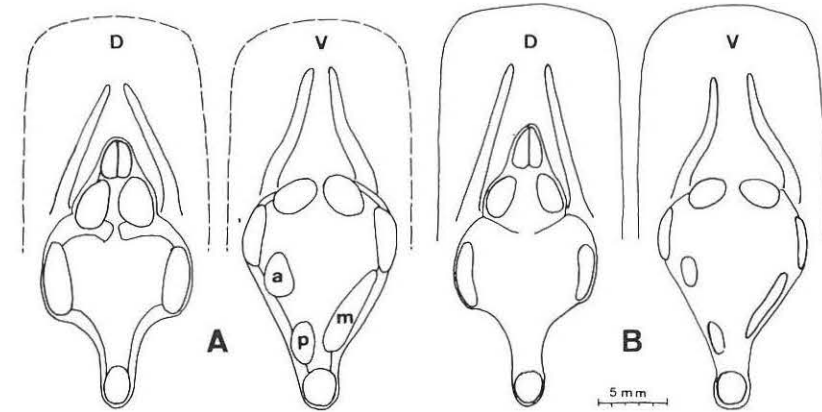


Fig. 3. Arrangement of the body muscles and disposition of the two main anterior canals of the mantle of specimens from Asamushi (D: dorsal side; V: ventral side). A. Diagram showing the variability of the outlines of the muscles and of the surrounding muscle line (established on 10 animals); B. A representative individual.

mm. The results are shown on table 1: w/L ratios are close to the published ranges of *Lingula anatina*, *L. rostrum*, *L. reevei*. HAYASAKA (1932) indicated the measurements of one specimen, length 31.5 and width 14; the w/L ratio is 0.444.

The colour various shades are from transparent yellowish green in small individuals (up to about 20 mm) to greenish brown with bright emerald-green anterior and lateral edges. Often growth lines are green or red brown underlined (Fig. 4a).

The umbonal beaks of both valves (Fig. 2) are acute. The interior part of the umbonal region of the dorsal valve is triangular-shaped and has a straight slope; this of the ventral valve has a pedicular groove continuous with the inner side of the valve and often with growth lines sometimes reddish underlined.

BODY MUSCLES AND ANTERIOR MANTLE CANALS

The arrangement of the musculature (Fig. 3, 4d) is elongate. On the ventral side along the left body muscle line is convex behind the median internal oblique muscle. On the dorsal side, both anterior and posterior intenal oblique muscles are well detached (respectively m, a, p, on Fig. 3).

Both main anterior canals of the mantle are straight sometimes slightly incurved on the dorsal side, and those on the ventral side are gently incurved (Fig. 3, 4b, 4d).

The anterior margins of the mantle show a strong blackish color (Fig. 4a, 4b).

PEDICLE

The pedicle is whitish flesh coloured.

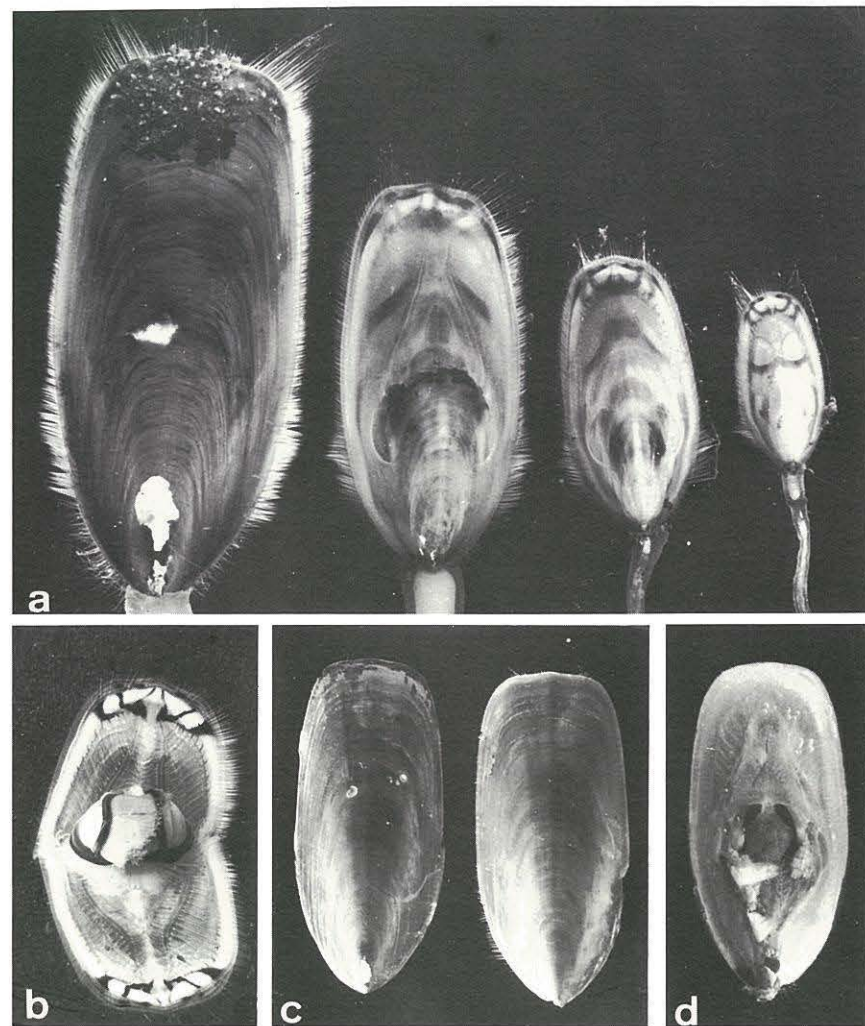


Fig. 4. *Lingula anatina* from Asamushi: a. Complete animals of different sizes ($\times 2.2$); b. View of the pallial cavity showing the pallial colouring and the disposition of the mantle canals ($\times 1.9$); c. Exterior view of a dorsal and a ventral valve ($\times 1.5$); d. A ventral side of the body ($\times 1.6$).

DISCUSSION

The characteristics of the specimens from Mutsu Bay are rather close to *Lingula anatina* than to *L. reevei*. The shape of the shell is similar to this of *L. anatina* but the colouring is more brownish in older individuals, yet CHUANG (1962) stated that the prevailing colour of the shell of *L. anatina* may vary with the environment and with the locations. The umbonal regions are close to *L. anatina* but the beak of the

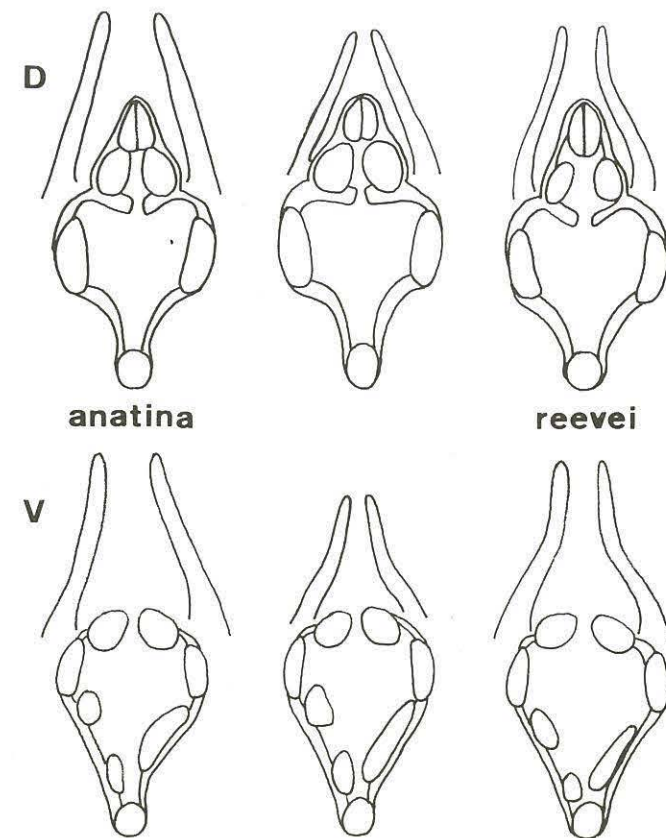


Fig. 5. Comparative diagrams of the arrangement of the body muscles and the disposition of the two main anterior canals of the mantle of *Lingula anatina* and *L. reevei* (from Emig, 1982), and of the specimens from Asamushi (in median position) (D: dorsal side; V: ventral side).

dorsal valve shelves more and has a longer slope; the pedicular groove is continuous with the inner surface of the ventral valve as in *L. reevei* while this groove is with a break in *L. anatina* (EMIG, 1982).

The muscle arrangement of both ventral and dorsal sides is similar to this of *L. anatina* (Fig. 5). Still the median internal oblique muscle may extend some more and the body muscle line is less incurved at this level but do not reach the feature of *L. reevei*. The disposition of the mantle canals (Fig. 5) is yet closer to *L. anatina*, though the canals of the dorsal side of some individuals may be slightly incurved drawing closer to the disposition shown in *L. reevei* and the disposition on the ventral side goes between those of the both cited species. Our specimens have a strong blackish pallial colouring as well as in *L. reevei*, but the colour retention in specimens stored in fixative is only over few years (up to about 2 or 3 years).

At least the pedicle has an intermediate colour between *L. anatina* (fleshy) and

L. reevei (whitish).

In conclusion, the *Lingula* specimens from Mutsu Bay belong to *L. anatina* and the name *Lingula nipponica* given by HAYASAKA (1931) to these specimens has to be considered as synonym with *L. anatina*; my previous opinion (EMIG, 1982) is corroborated.

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