NOTE ON A NEW SPECIES OF THE VENERID GENUS *ATOPODONTA* FROM THE VIGO-MIOCENE OF LUZÓN (PHILIPPINE ISLANDS), WITH REMARKS UPON THE GENERIC CHARACTER

BY

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Preliminary remarks.

1) Examining the SEMPER-collection of mollusca from the Philippines kept in the Leyden Geological Museum, I met with some generic undetermined specimens of a representative of the genus *Atopodonta* (from Tertiary strata only rarely recorded), all belonging to one and the same species, which appeared never to have been described before. This genus [1]) is known from the Eocene of the Paris basin represented by two species, viz. the type-species *Atopodonta conformis* (DESHAYES), 1860 [DESHAYES, Anim. s. vert., I, p. 419, plate 28, fig. 14—16 ("*Venus*"); COSSMANN, Catal. ill., I, 1886, p. (98—100) 99, plate 6, fig. 3—6 (e x c l. plate 8, fig. 3—4)] and *A. tapina* COSSMANN, 1886 (l. c., p. 100, plate 6, fig. 7—9). These are the only European species.

In 1941 I was in a position to describe the first Neogene representative that is known, strange enough this time from the Younger Miocene of Eastern Borneo; and only some time ago I recognized a second species in a collection of mollusca from the Older Miocene Rembang-beds of Java. To these scarce data the shells of the SEMPER-collection form a welcome addition.

The description of both these Indopacific species is based upon well-preserved specimens but the first time I met with this interesting genus I overlooked the fact of having to do with an *Atopodonta*-species and not with the related genus *Cyprimeria*. The hinge of *A. sawitrae* and the other species (which will be described in another publication) as well as of *A. luzonensis* agrees perfectly with the formula of that of the typical species which I have at my disposal in a collection of Eocene shells from the Paris basin. In 1913 COSSMANN (Cat. ill., append. 5, p. 57) gave good illustrations of the hinge and he also briefly discussed the differences between *Cyprimeria* CONRAD, 1864 [2]) and *Atopodonta* (l. c., p. 56); DESHAYES in 1860 (l. c.) also drew attention to the — properly speaking only s u p e r f i c i a l — similarity between his "*Venus*" *conformis* [*Atopodonta*] and "*Venus*" *obliqua* LAMARCK [the only Eocene *Cyprimeria*-species that is known].

[1]) Cf. FISCHER, Manuel, 1887, p. 1088; JUKES-BROWNE, 1914, I, p. 62; FRIZZELL, 1936, p. 24.

[2]) Cf. JUKES-BROWNE, 1914, II, p. 87; FRIZZELL, 1936, p. 33.

2) Regarding the classification and diagnosis of the genus *Atopodonta* we find contradictions: cf. FISCHER (l. c.) and THIELE (Handbuch, S. 854). THIELE namely mentions *Atopodonta* [non] 1887 as a synonym of *Veneriglossa* DALL, 1886, while this group would possibly be a synonym of *Vesicomya* DALL, 1886 (apparently according to DALL's own description: "Blake" mollusca I, 1886, p. 275). According to FISCHER (l. c., p. 1074) *Vesicomya* [1]) should be looked upon as an *Isocardia*-group, while THIELE classified this group under the genus *Kellyella* SARS, 1870, correctly uniting the Kellyellidae and Isocardiidae to one greater group, the Isocardiacea. This indeed seems to be the best classification, as both groups show much resemblance (FISCHER also drew attention to the similarity between *Vesicomya* and *Isocardia*). But THIELE apparently did not check the characteristics of *Atopodonta* and regarded this group as a synonym of *Veneriglossa* only on the authority of DALL, who in 1889 ("Blake" mollusca, II, Add. et correct. to I, p. 440) wrote: "The genus Atopodonta, COSSMANN [non] 1887 ..... appears to be identical with this group [*Veneriglossa*], if the figures of the type are to be relied upon". As DALL could not know, the hinge of *Atopodonta* was partly not correctly figured in 1886, and really COSSMANN's bad figure 4 (l. c., 1886, plate 6) seems to indicate the hinge of an Isocardiacea-genus rather than that of a Venerid group and has nothing to do with the real hinge of the right valve; the hinge of the left valve was better figured, but the characteristics were also not clearly shown. Therefore DALL could not but hesitate; whether *Atopodonta* was a synonym of *Veneriglossa* or not, he could not rely upon the figures for settling this question. Fortunately COSSMANN in 1913 gave perfect illustrations of the hinge of *Atopodonta*.

Another fact, which possibly also confused DALL, namely the identification of COSSMANN's "young shell" of *Atopodonta conformis* (l. c., 1886, plate 8, fig. 3—4), may be called very doubtful and I daresay in this case we have to do with an *Isocardia*-species, showing all the typical features of this genus instead of those of *Atopodonta conformis* [2]). Perhaps DALL also did not rely upon COSSMANN's determination, because in his quotation he did not mention this shell.

The differences between the hinges of Isocardiacea (especially *Kellyella* [3]) and *Atopodonta* [4]) are most striking and only from DALL's statement of the similarity [5]) between *Veneriglossa* and young shells of *Vesicomya* [6]) we may already assume there is not the slightest resemblance between the hinge of the real *Atopodonta*-group [7]) and *Veneriglossa* or other Kellyellidae. The only further indications we now have, that *Veneriglossa* and *Atopodonta* are different, are given by DALL's imperfect description of the characteristics of the first group. In 1886 (l. c., p. 275) he gave the following diagnosis: "beaks twisted away from the hinge-line so that their tips are widely separated. Hinge with the teeth arranged much as in Cytherea sayana Conrad, but with the

[1]) Type: the recent *Vesicomya atlantica* (SMITH) (cf. DALL, l. c., p. 272—273).

[2]) COSSMANN himself already mentioned the identification of the "young shells" as very doubtful.

[3]) FISCHER (l. c., p. 1033) figured the hinge of *Kellyella abyssicola* SARS, THIELE (l. c., p. 854) that of *K. miliaris* (PHIL.).

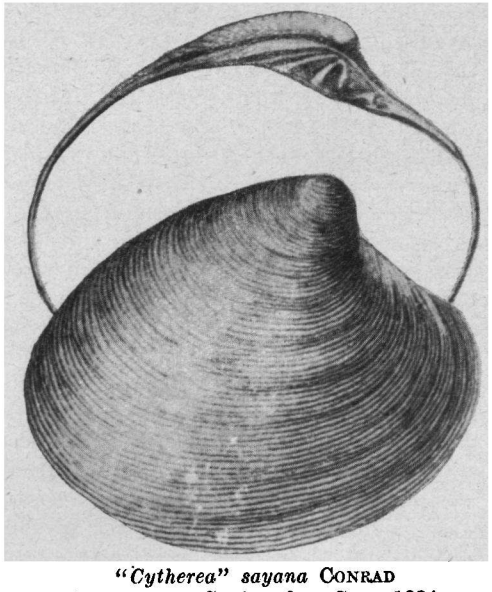
[4]) COSSMANN, l. c., 1913.

[5]) Perhaps in this case DALL only meant the outlines of the shells, not the hinges!

[6]) Cf. *Vesicomya atlantica* (SMITH), "Challenger" lamellibr., 1885, p. 157, plate 6, figures 8, 8a—b [described as a *Callocardia*-species]; cf. also other species.

[7]) The habitus of this group is also very typical and totally different from that of *Vesicomya*.

depressions prolonged into pits, the ends of the teeth sharp and pointed, and the ventral margin of the hinge-shelf upturned [!]. Ligament long, in a deep groove, passing away from the hinge-line under the beaks as in Isocardia". I give here a reproduction of SAY's illustration of his "*Cytherea*" *convexa* (1824, p. 149, Reprint, 1896, p. 149 (325), plate 12, fig. 3), renamed in 1833 (CONRAD, 1833, p. 345: *Cytherea sayana*). It is easy to see, that the hinge of this species does not resemble that of *Atopodonta* more than some other Venerids do, and that consequently *Veneriglossa* will prove to be still more different, if we can built up a reliable scheme of the hinge from DALL's above-mentioned diagnosis. As, however, DALL's description (without figure) cannot be clear in every respect, and as there is not a figure completing the diagnosis, it cannot be decided with certainty whether really *Atopodonta* and *Veneriglossa* are different or not; unfortunately DALL in these (l. c.) first two and all following publications never figured the type of his genus *Veneriglossa*, nor did he give further descriptions. So we must await further publication of his types by other malacologists, because under the present circumstances it is impossible to obtain for instance photographs of the type of *Veneriglossa* and to compare them with *Atopodonta*. Apparently it may be supposed, that these two groups will show much difference.



"*Cytherea*" *sayana* CONRAD (= *convexa* SAY), after SAY, 1824.

3) In the Tertiaries of North-Western India, Burma, Formosa (= Taiwan), the Japanese and Australian to New-Zealand regions as well as in the American Tertiary and European Oligocene to Neogene this genus is not represented. Consequently *Atopodonta* seems to have been restricted to Western Europe in Eocene time (with two species) and then died out in these regions; but meanwhile it had migrated to South-Eastern Asiatic seas at some undefined moment(s) between Lutetian and Miocene and got a greater horizontal and vertical distribution in the Indopacific Neogene. This therefore seems to be one of those instances very common to the different development of the European and Indopacific (related) molluscan life during the Tertiary period. Almost the same phenomenon occurs with *Cyprimeria*: this genus was restricted to the Paris basin in Eocene time (Lutetian) with one species, *Cyprimeria obliqua* (LAMARCK) [DESHAYES, l. c., p. 420; COSSMANN, l. c., 1886, p. 95; l. c., 1913]. The second species[1]) is only known from the Neogene (Pliocene) of Karikal (French) in the South-Eastern part

[1]) I mean tertiary species, because *Cyprimeria* has been well-known already from Cretaceous strata.

of British India: *Cyprimeria nepotina* COSSMANN (Karikal, 4, 1923, p. 138, plate 7, fig. 12—14).

In the Indopacific area we know at present three species of *Atopodonta*, viz.:

Atopodonta luzonensis BEETS: Y. Miocene, Vigo-beds of Luzón (Philippines), described below.

Atopodonta manoharae BEETS: Older Miocene, Rembang-beds of Java (Dutch East-Indies), described in another publication.

Atopodonta sawitrae (BEETS): Y. Miocene, Gelingseh-beds, and at the transition from Taballar-beds to Menkrawit-beds of Sangkulirang-Bay and Mangkalihat-Peninsula of Eastern-Borneo (Dutch East-Indies).

Perhaps a fourth species has been known since 1883: *"Dosinia" hemilia* BOETTGER [Tertiärform. Sumatra, II, p. 117, plate 4, fig. 2a—c (= Palaeontographica, p. 63)], only represented by a left valve from the Younger Miocene *"Eburna"*-[= *Babylonia*]-marls of Western-Sumatra; this species shows resemblance with *Atopodonta*, but its description (cf. middle cardinal tooth) does not exactly agree with the poor figure; so it is left open to discussion whether this or another systematical placing is right until a careful examination of the type-specimen has been made. Besides *"Dosinia" hemilia*, if it has to be seen as a representative of the genus *Atopodonta*, is clearly different from its other species.

Material.

Prof. K. MARTIN (cf.: Ueber tert. Foss. v. d. Philipp., 1895) had already arranged the material of the SEMPER-collection provisionally and he also identified several species, but the revision of the entire material will take at least several months and as I had for the moment no time to begin these investigations, it might be of some interest to describe the new species above-mentioned awaiting further determinations. Both stratigraphy and palaeontology of the Philippines will be helped very much by a thorough study of the entire molluscan material, but as far as I can see this SEMPER-collection will not point to sharply defined ages of the fossiliferous strata they derive from, and our knowledge of the Philippine Neogene requires careful field investigations before a stratigraphical division as the existing one of the East-Indian Archipelago Tertiary can be made up. For the moment I follow MARTIN in considering the fossiliferous strata of Luzón, which MARTIN discussed in his provisional paper (1895), as Younger Miocene in Dutch East-Indian sense.

In concluding these preliminary statements I wish to express my gratitude to the directorate of the Leyden Geological Museum for the loan of the material; further I am much indebted to the foundation "Zoölogisch Insulinde Fonds", which by its financial support enabled me to carry on this work as well as other investigations about Dutch East-Indian mollusca, put at my disposal in the course of some seven years.

Description.

Classis *Pelecypoda*
Ordo *Eulamellibranchiata*
Familia *Veneridae*

Genus *Atopodonta* COSSMANN, 1886.
[Genotype: *A. conformis* (DESH.)]

ATOPODONTA LUZONENSIS spec. nov.

Plate XXXII, Figures 1—16.

Numerous valves passing through different ranks of preservation are on hand. The oval to trigonal, arched, thick-shelled valves with a smooth surface, nearly unsculptured. Margins of the valves also entirely smooth. The umbones prominent, placed rather anteriorly and curved towards the anterior margin. Posterior dorsal margin less convex than the well-rounded ventral margin, angularly passing into the somewhat flattened posterior margin. Ventral margin without separation passing into the short anterior margin, the latter into the nearly straight anterior dorsal margin.

Beginning near the umbo an originally sharp posterior radial rib (cf. fig. 3, 6, 8, 10) is developed, close to the dorsal limitation of the ligament. In this way a narrow dorsal radial part of the shell is separated; in the middle of this zone a rather broad groove, separated from the ligamental groove by an elevated zone which is nearly exactly as broad as the zone on the other side of the groove. The radial rib becomes more rounded and flattened to the posterior margin of the valves.

The other, larger part of the valves is regularly arched, the only sculpture consisting of numerous fine concentric *striae*, some of which may be more prominent. The lunule (cf. fig. 1, 2, 11, 12) is heart-shaped, only slightly depressed, limited by a slightly impressed fine line, which may be nearly absent, but is always indicated. Hinge-plate on the ventral side concave behind, convex anteriorly.

L e f t v a l v e (cf. fig. 13—14, 16): ligamental groove elongated, v-shaped in cross-section, lying between fairly high ribs: the ventral one tripartite (a fine additional rib along the greater part of the ligament, in the centre a broader one, which disappears anteriorly and on part of which lies the posterior cardinal tooth). The posterior cardinal tooth (*4b*: cf. COSSMANN, l. c., 1913) elongated, somewhat curved and flattened, separated from the strong middle cardinal tooth (*2b*) by a deep elongated depression (in which fits the posterior cardinal tooth of the right valve). The middle cardinal tooth strong, provided with an anterior dorsal prolongation passing into the short, partly lamelled anterior cardinal tooth (*2a*) which becomes broader ventrally. The latter is on the dorsal side vertically grooved (in this flattened groove fits the anterior cardinal tooth of the right valve). Anterior and middle cardinal tooth separated by a rather small depression for the middle cardinal tooth of the right valve. Anterior lateral tooth (A_{II}) extremely small and low, close to the ventral end of the anterior cardinal tooth.

In the r i g h t v a l v e (cf. fig. 4, 9, 15) the rib below the ligamental groove is again slightly tripartite (but of course now without a cardinal tooth, which represents the third part in the left valve). The posterior cardinal tooth (*3b*) elongated, narrow, bifid (more indistinctly than in other species), separated from the ligamental rib by a narrow depression for the posterior cardinal tooth of the left valve, on the other side by a very broad depression from the middle cardinal tooth (*1*) which is short and prominent, pointed and (dorsally) curved towards the anterior margin of the valve. Anterior cardinal tooth (*3a*) small, broader on the ventral side, on the dorsal side with a distinct prolongation along the hinge-margin (cf. fig. 15). Both anterior cardinal teeth nearly touch each other and are only separated by a deep narrow groove broadening anteriorly. In front of the depression, on the terminal part of the hinge-plate, a very slight, small impression may be

visible (only on the holotype: fig. 4), in which fits the anterior lateral tooth of the left valve.

Of all valves the interior is only partly visible, so adductor impressions and pallial line are not observed, but this species shows so exactly the typical generic features that it may be supposed the pallial sinus will be very weak or missing, as is the case with all species belonging to this genus.

Atopodonta sawitrae (BEETS) (Mangkalihat, 1941, p. *165*, 193, plate 8, fig. 334—337) is by far the closest related species, but clearly different after careful examination (the type-specimens are on hand): bearing a broader radial zone behind the posterior radial rib; the groove is deeper near the umbo and disappears close to the dorsal hinge-margin (in *A. luzonensis* this groove is still clearly indicated at this margin); the part of the shell between this groove and the ligament is considerably shorter and narrower than the other part of the posterior zone. The hinge-plate is much shorter than in *A. luzonensis* and the posterior cardinal tooth of the left valve is much higher and more curved; the middle cardinal tooth is shorter, the anterior cardinal tooth with a deeper dorsal impression and directed more towards the front; the anterior lateral tooth much larger and standing more apart from the anterior cardinal tooth. Ventral ligamental rib of right valve thin and higher, posterior cardinal tooth much broader and more clearly bifid (cf. fig. 5: the hinge of an already mentioned, but not figured right valve from Sangkulirang-Bay), the anterior cardinal tooth with a more elongated posterior prolongation terminating on the anterior end of the posterior cardinal tooth. Lunule with 1—2 grooves (one about in the middle of the lunule).

Atopodonta manoharae BEETS from the Miocene of Rembang is less related: more flattened, with a much narrower and weaker grooved radial zone between the posterior radial rib and the ligament, without an elevated part along the dorsal side of the groove (close to the ligament). This species is somewhat closer related to the Paris Eocene species but also differs from these representatives in features of hinge and dorsal concave zone.

Locality: Vigo-Miocene of Luzón: Locality number 3, right side of the river Ilarön, 1½ hours above Minanga (cf. MARTIN, 1895, p. 58, 61, 66). From this locality MARTIN mentioned the following specifically determined mollusca: *Clavilithes verbeeki* MART., *Murex brevispina* LAM., *Argobuccinum bituberculare* (LAM.) [= *raninoides* (MART.)], *Rostellaria javana* MART. and *Polinices mammilla* (LINN.).

Types: Museum of Geology and Mineralogy, University of Leyden.

Haarlem, June 1942.

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Explanation of plate XXXII.

Figures 1—4: *Atopodonta luzonensis* BEETS (right valve, holotype); length 15, height 13.4, thickness (1 ×) 4 mm.

Figure 5 : *Atopodonta sawitrae* (BEETS); hinge of a right valve from the Gelingseh-beds of Sangkulirang (cf. BEETS, 1941, p. 193); height 33 mm.

Figure 6 : *Atopodonta luzonensis* BEETS (left valve, paratype 5), posterior dorsal part; length 33.5 mm.

Figures 7—9: *A. luzonensis* (right valve, only partly preserved; paratype 4); length of figured part 26.2, thickness (1 ×) 9.8 mm.

Figures 10—14: *A. luzonensis* (left valve, paratype 1); length 29.3, height 25.4, thickness (1 ×) 10.7 mm (fig. 14: hinge, enlarged: anterior cardinal tooth somewhat damaged at the ventral-anterior end).

Figure 15 : *A. luzonensis* (right valve, paratype 3); length of figured part 9.4 mm.

Figure 16 : *A. luzonensis* (left valve, paratype 2); length of figured part 9.5 mm.


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