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THE EVOLUTION OF THE EUCARIDA, (CRUSTACEA, EUMALACOSTRACA),
IN RELATION TO THE FOSSIL RECORD

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ADDITIONS TO A CATALOGUE OF THE DESCRIBED RECENT AND
TERTIARY SPECIES OF *ACESTA* AND *PLICACESTA*

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I. INTRODUCTION

In an earlier number of the *Tulane Studies in Geology* (vol. 1, no. 2, 1963), the writer presented a catalogue of the described Recent and Tertiary species of *Acesta*, based upon references collected while preparing the description of *Lima (Acesta) bullisi* H. E. Vokes. At that time it was noted that since the catalogue was the result of a canvass of the literature it was "quite possible" that some species had been overlooked. This latter statement subsequently has proved to be correct and it is now possible to supplement the previous listing and thus to make it more complete.

The writer is greatly indebted to Professor R. L. Merklin of the Paleontological Institute, Akademy Nauk, U.S.S.R., for calling his attention to the eastern Siberian occurrences of *Acesta* and furnishing a photocopy of an important reference.

II. ADDITIONS TO THE CATALOGUE OF
LIMA (ACESTA)

RECENT SPECIES

Atlantic Basin Area

LIMA (ACESTA) ANGOLENSIS Adam and
Knudsen

Lima angolensis ADAM and KNUDSEN, 1955,
Bull. Inst. Roy. des Sci. Nat. Belgique, **31**
(61), pp. 19-23, pl. 2, figs. 1-4.

Range: The type of this species was dredged at Station 88 of the Belgian Oceanographic Expedition (1948-1949) in the eastern portion of the South Atlantic Ocean off the coast of Angola, Lat. 10°45' S., Long. 13°07' E., from 400 to 500 meters depth.

Size: "Dimensions.—Longeur: 153 mm; largeur: 122 mm; epaisseur: 49 mm."

Ecologic information: The bottom sediment at Station 88 is given as being of green sandy mud; the depth, as noted above, 400 to 500 meters. No temperature record was given.

Notes: This species is distinguished from *L. (A.) excavata* (Fabricius) mainly on the presence of a "nodule" at each extremity of the cardinal margin of the right valve received between two elongate, parallel "nodules" on the left. These structures, which are lacking in *excavata*, are described as being "très peu apparents." As illustrated the posterior auricle seems proportionately to be somewhat shorter in the new species than it is in *excavata*. This results in a more broadly rounded posterior dorsal part of the shell.

TERTIARY SPECIES

Western Pacific: Eastern Siberia and
Sakhalin Island

LIMA (ACESTA) SAKHALINENSIS
Slodkevich

Lima (Acesta) concentrica KHOMENKO, 1934, Tr. Petrol. Geol. Prospecting Inst. [NGRI], (A) **40**, p. 30, pl. 1, fig. 7 [non *Lima concentrica* Sowerby 1888, Zool. Soc. London, Proc. for 1888, p. 207, pl. 11, fig. 20].

Lima sakhalinensis SLODKEVICH, 1938, Paleont. USSR, **10** (3), Tertiary Pelecypoda from the Far East, pt. 1, p. 211 (Russian text), pl. 42, fig. 8; pt. 2, p. 113 (English text).

Lima sakhalinensis is described as having the shape of *Lima (Acesta) goliath* Sowerby (1883, p. 30, pl. 7, fig. 3) a Recent species living off the coasts of Japan, and known also (see H. E. Vokes, 1963, p. 87) from the Upper Miocene and Pliocene de-

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posits of the same region. It differs from the Japanese species, however, in details of the ornamentation, possessing only "the finest concentric lines of growth" and "not elevated, gentle, irregular concentric folds bearing the same character as on *Palliolium* (*Delectopecten*) *pedroanus* (Trask)." (Slodkevich, *sup. cit.*, p. 113)

The species was described from the Upper Pil Series, Lower Miocene, from North of Cape Pilvo, in the northern part of Sakhalin Island.

LIMA (ACESTA) new species?

Lima goliath "Smith". SLODKEVICH, 1938, Paleont. USSR, 10 (31), Tertiary Pelecypoda from the Far East, pt. 1, p. 212 (Russian text, *pars*), pl. 43, figs. 1, 1a (only); pt. 2, p. 114 (English text, *pars*); [non pl. 43, fig. 2].

Slodkevich (*sup. cit.*) discusses and figures two large limid specimens from the upper Miocene of Kamchatka. Both are referred to *Lima goliath* "Smith" [= Sowerby], but neither appears to have been identified correctly. The larger specimen, illustrated in his figures 1 and 1a, is a broadly orbicular form which, judging from his illustration has very weakly developed *Acesta*-type radial ornamentation. It appears, to the present writer, to be most like the Japanese Miocene *Lima* (*Acesta*) *omorii* Aoki (1956, p. 189, pl. 29, fig. 1; text fig. 2:7), described from Iwate Prefecture in the northern part of Honshu Island.

The smaller specimen has well-developed radial ornamentation preserved on a small portion of the valve and may represent a species similar to *Lima* (*Acesta*) *celebensis* Bartsch (1913, p. 240, pls. 18, 19) or, more probably, is a *Lima* (*Plicacesta*) close to *smithi* Sowerby (1888, p. 207, pl. 11, fig. 12).

Europe: France

Cossmann has described two very small species from the Eocene of the Loire Basin of France which he has referred to *Lima* (*Acesta*). Both are too small and too imperfectly illustrated to permit any conclusions as to their systematic position without access to the original specimens. For the present, therefore, they will be tentatively referred to *Acesta*, although with considerable doubt.

LIMA (ACESTA ?) DUMASI Cossmann

Lima (*Acesta*) *dumasi* COSSMANN, 1904, Bull. Soc. Sci. nat. de l'Ouest de la France, (2) 4, p. 163, pl. 2, fig. 24; pl. 3, figs. 3, 4.

This small species (length 8.5 mm, width 6.5 mm) has an ornamentation similar to that of many species of *Acesta*. The liga-

mental pit is described, however, as being triangular with the summit "un peu incurvé en avant." This condition, considered in more detail below in the discussion of *Lima iheringi* (Soot-Ryen), is not that characteristic of *Acesta*—in the adult stage at least. Furthermore, none of the specimens of *excavata* or of *bullisi* available for examination show any trace of a structure in the immature stages that would be described as having the apex only a "little incurved" in front of the main ligamental mass.

LIMA (ACESTA ?) HYPHANTA Cossmann

Lima (*Acesta*) *hyphanta* COSSMANN, 1904, Bull. Soc. Sci. nat. de l'Ouest de la France, (2) 4, p. 164, pl. 3, figs. 14, 15.

This minute form is known from a single specimen 4.5 mm high and 3.5 mm wide. The general outline is similar to that of species of *Acesta*, but the ornamentation of an "élégant treillis de stries rayonnants et obliquement curvilignes, dont l'intersection produit une multitude de fines ponctuations" seems foreign to this subgenus.

SPECIES INCORRECTLY REFERRED TO

ACESTA

South America

ACESTA IHERINGI Soot-Ryen

Lima patagonica VON IHERING, 1907, Anales Mus. Nac. de Buenos Aires, 14 [ser. 3, 7], p. 262, pl. 9, fig. 60. [non Dall, 1902, Nautilus, 16 (2), p. 16].

Acesta iheringi SOOT-RYEN, 1959, Lunds Univ. Arsskrift, (N.F.) (2) 55 (6), p. 33. [n.n. pro *Lima patagonica* von Ihering, non Dall].

In the earlier paper (1963, pp. 80-81) it was noted that von Ihering's species was a junior homonym of *Lima* (*Acesta*) *patagonica* Dall; overlooked, however, was the fact that Soot-Ryen had proposed the replacement name *Acesta iheringi*. No basis is given for the reference to *Acesta*, and in the writer's opinion the form is incorrectly referred to that subgenus (or genus). In the original description von Ihering notes that the anterior auricle is larger than the posterior, whereas in *Acesta* it characteristically is greatly reduced through the encroachment of the excavate lunule. The latter is one of the most noticeable features of the shell, but von Ihering does not even mention the lunule in his description. The reduction of the anterior auricle results in the umbones being essentially at the anterior end of the dorsal margin with the cardinal area almost wholly posterior in position. This has as a further result, the development of a markedly oblique ligamental pit (see H. E. Vokes, 1963, pl. 1, figs. 2, 3; pl. 2, fig. 3). The pit in the Patagonian species was described by von Ihering as follows: "La fossette ligamentaire est

triangulaire, à base plus large que la hauteur et inclinée un peu en dehors." It appears to be wholly different from that characteristic of *Acesta*.

According to von Ihering, his species is similar to *Lima angulata* Sowerby (1843, p. 86, pl. 22, figs. 39, 40) [non *Lima angulata* Münster, 1841], which has been renamed *Lima (Mantellum) orbigny* Lamy (1930, p. 180). This species is the type, by original designation, of the "section" *Submantellum* Olsson & Harbison 1953 (p. 60). While the original illustration given by von Ihering for his *Lima patagonica* is not at all satisfactory, the details of shape and proportion agree very favorably with the illustrations of *Lima orbigny* Lamy (cf. for example, Olsson, 1961, pl. 17, fig. 3), and the writer is of the opinion that the correct denomination for the species is *Lima (Submantellum) iheringi* (Soot-Ryen).

III. ADDITIONS TO THE CATALOGUE OF *LIMA (PLICACESTA)*

LIMA (PLICACESTA) SPHONI Hertlein

Lima (Plicacesta) sphoni HERTLEIN, 1963, Calif. Acad. Sci., Occas. Pap. no. 40, p. 3, figures 1-3.

Since the publication of the previous catalogue (H. E. Vokes, 1963), Hertlein has described *Lima (Plicacesta) sphoni* dredged from 457-549 meters (250-300 fathoms) between Santa Catalina and Santa Barbara Islands, California. This, the second Recent species of *Plicacesta*, the other being the type, *L. (P.) smithi* Sowerby, is a much larger form being 114 mm high and 91 mm wide. Sowerby (1888, p. 207) stated that the type of *smithi* was 63 mm high and 51 mm wide; Oyama (1943, p. 45) gives measurements of a larger specimen as 98 mm high and 80 mm wide. The two species also differ in details of shape and ornamentation.

LIMA (PLICACESTA) new species

?, *Lima goliath* "Smith". SLODKEVICH, 1938, Paleont. USSR, 10 (3), Tertiary Pelecypoda from the Far East, pt. 1, p. 212 (Russian text, *pars*), pl. 43, fig. 2 (only); pt. 2, p. 114 (English text, *pars*).

Lima aff. *goliath* Sowerby. MERKLIN, 1954, Doklady, Akad. Nauk, USSR, 95 (2), pp. 379-380, text figs. 1, 2.

As noted above, the smaller of the two specimens from the upper Miocene of Kamchatka figured by Slodkevich as *Lima goliath* Smith [= Sowerby] may well prove to be a specimen of *Lima (Plicacesta)*. Another specimen, which possibly represents the same species, was collected in the Anadyra region, south of the Chukotka Peninsula. The figures given by Merklin (*sup. cit.*) show remnants of a relatively thick shell adhering to the incomplete internal

mold which appears also to exhibit traces of the radial sculpture, suggesting that the shell was plicate, and hence referable to *Plicacesta*. This suggestion receives confirmation in a recent letter from Prof. Merklin in which he says: "I think now that this form is rather *Lima (Plicacesta)*."

The species is apparently of large size. Although the original illustration was labelled as being of natural size, and indicated a specimen of approximately 80 mm height with the dorsal margin missing, a reprint kindly furnished by Prof. Merklin bears the notation in ink "2/3", suggesting that the specimen had a height of at least 120 mm. It appears to differ from *L. (P.) smithi* in details of shape, with a longer relatively straight anterior margin and a proportionately broader shell. The ornamentation is too incompletely represented to permit it being compared with that of the Recent species.

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