PALÆONTOGRAPHICAL SOCIETY

LONDON

VOLUME 58, No. 273
1904

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A MONOGRAPH

OF THE

CRETACEOUS LAMELLIBRANCHIA

OF

ENGLAND.

BY

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VOL. II. PART I.

LIMIDÆ.

PAGES 1—56; PLATES I—VII.

LONDON:

PRINTED FOR THE PALÆONTOGRAPHICAL SOCIETY.

1904.

First reprinting, 1975, Johnson Reprint Corporation
Printed in the United States of America

DESCRIPTION OF SPECIES.

Family—LIMIDÆ, *d'Orbigny*.

Genus—LIMA, *J. G. Bruguière*, 1797.

('Encyc. méthod.,' Tabl. Vers., pl. ccvi.)

LIMA CANALIFERA, *Goldfuss*, 1836. Plate I.

1836.	LIMA CANALIFERA,	*A. Goldfuss.*	Petref. Germ., vol. ii, p. 89, pl. civ, fig. 1.
1839.	—	— *H. B. Geinitz.*	Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. i, p. 24.
—	—	MULTICOSTATA, *Geinitz.*	Ibid., p. 24, pl. viii, fig. 3.
1841.	—	CANALIFERA, *F. A. Römer.*	Die Verstein. d. nord-deutsch. Kreidegeb., p. 56.
—	—	LATICOSTA, *Römer.*	Ibid., p. 57, pl. viii, fig. 9.
1843.	—	MULTICOSTATA, *H. B. Geinitz.*	Die Verstein. von Kieslingswalda, p. 23, pl. vi, fig. 10.
1846.	—	LATICOSTA, *A. E. Reuss.*	Die Verstein. der böhm. Kreideformat., pt. 2, p. 34.
—	—	MULTICOSTATA, *Reuss.*	Ibid., p. 34, pl. xxxviii, figs. 7, 8, 18.
—	—	— *H. B. Geinitz.*	Grundr. d. Verstein., p. 472.
1850.	—	CANALIFERA, *Geinitz.*	Das Quadersandst. oder Kreidegeb. in Deutschland, p. 190.
—	—	MULTICOSTATA, *Geinitz.*	Ibid., p. 192.
—	—	CANALIFERA, *A. d'Orbigny.*	Prodr. de Pal., vol. ii, p. 167.
? —	—	MULTICOSTATA, *d'Orbigny.*	Ibid., p. 248.
—	—	LATICOSTA, *d'Orbigny.*	Ibid., p. 249.
1863.	—	CANALIFERA, *A. Kunth.*	Zeitschr. d. deutsch. geol. Gesellsch., vol. xv, p. 726.
—	—	— *R. Drescher.*	Ibid., vol. xv, p. 356.
? 1868.	—	MULTICOSTATA, *E. Eichwald.*	Lethæa Rossica, vol. ii, p. 459.
1870.	—	MULTICOSTA, *F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 174.
—	—	CANALIFERA, *Pictet and Campiche.*	Ibid., p. 175.
1872.	—	— *H. B. Geinitz.*	Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 2), p. 38, pl. ix, figs. 6—8.

1876. LIMA CANALIFERA, *D. Brauns.* Zeitschr. f. d. gesammt. Naturwiss., vol. xlvi, p. 386.
1877. — — *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 132, fig. 117.
1893. — cf. CANALIFERA, *R. Michael.* Zeitschr. der deutsch. geol. Gesellsch., vol. xlv, p. 242.
1898. — CANALIFERA, *G. Müller.* Mollusk. Untersenon. v. Braunschweig u. Ilsede (Abhandl. d. k. preussisch. geol. Landesanst. N.F., Heft 25), p. 28.
1901. — — *H. Imkeller.* Kreidebild. am Stallauer Eck (Palæontographica, vol. xlviii), p. 32, pl. iii, fig. 10.
— — — *F. Sturm.* Jahrb. d. k. preussisch. geol. Landesanst. für 1900, vol. xxi, p. 90.

Description.—Shell moderately convex, oval or subtriangular; height a little greater than length; outline rounded, except the antero-dorsal margin, which is nearly straight and rather long. Apical angle from 105° to 110°. Umbones rather small, close together. Anterior area slightly depressed, with small radial ribs. Anterior ears small; posterior larger, with growth-lines and faint radial ribs.

Ornamentation consists usually of 18, but sometimes of as few as 14 or as many as 21 very strong, rounded, straight ribs, which are separated by broader furrows. In well-preserved specimens numerous concentric linear ridges occur on both ribs and furrows, and projecting growth-ridges are seen at regular intervals on the ribs.

Measurements:

	(1)	(2)	(3)	(4)	(5)
Length	70	56	52	43	32 mm.
Height[1]	76	58	54	44	35 ,,

(1—5) Upper Greensand, Ventnor.

Affinities.—An exact comparison of the English specimens with the foreign examples of *Lima canalifera* is rendered difficult owing to the fact that the former have the shell well preserved whilst the latter occur chiefly as casts. In both cases the number and breadth of the ribs show considerable variation. The fine concentric ornamentation is the same in both, as is shown by Goldfuss' figure, but in some of the best preserved English specimens there occur also transverse ridges on the ribs at regular intervals. Somewhat similar ridges are shown in Goldfuss' figure, but they seem to be present chiefly on the sides of the ribs and

[1] In all species of *Lima* (unless otherwise stated) this is measured obliquely to the hinge-line so as to give the greatest height.

in the neighbourhood of the umbo only. With the exception of this character the English specimens agree closely with the foreign examples, and this difference may very well be due to the latter being much less perfectly preserved than the former. Moreover, in some English specimens the ridges mentioned are partly or entirely wanting.

The English examples occur at a lower horizon than those found abroad, namely, in the zone of *Pecten asper*. The foreign specimens are found in the Turonian and Senonian, and possibly also in the Cenomanian, and, like the English examples, they occur chiefly in beds of a sandy nature. This last fact may account for the absence of the species in the English Chalk, during the deposition of which the sea-floor was formed of ooze and was at a greater depth.

Lima Etalloni, Pictet and Campiche,[1] from the Valanginian, presents some resemblance to *L. canalifera*, but has a smaller apical angle; the character of its fine ornamentation is unknown.

Type.—Goldfuss' specimens came from the Senonian of Quedlinburg, Haltern and Regensburg.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Ventnor.

LIMA GALLIENNEI, *d'Orbigny*, 1847. Plate II, figs. 1*a*—*c*.

1847.	LIMA GALLIENNIANA, *A. d'Orbigny*.	Pal. Franç. Terr. Crét., vol. iii, p. 548, pl. ccccxx, figs. 1—3 (*Galliennei* on plate).
1850.	— — —	Prodr. de Pal., vol. ii, p. 166.
1854.	— GALLIENNEI, *J. Morris*.	Cat. Brit. Foss., ed. 2, p. 171.
1867.	— — *E. Guéranger*.	Album Paléont. de la Sarthe, p. 18, pl. xxiii, figs. 23, 24.
1869.	— — *F. J. Pictet and G. Campiche*.	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 168.
1871.	RADULA GALLIENNEI, *F. Stoliczka*.	Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.

Description.—Shell compressed, more or less oblong with rounded margin; height greater than length. Antero-dorsal margin straight or slightly concave. Apical angle large. Umbones close together. Anterior area only slightly depressed, with sharp borders.

Ornamentation consists of 12 to 15 strong, much elevated ribs with rounded

[1] 'Terr. Crét. Ste. Croix' (1869), p. 141, pl. clxiv, fig. 3.

summits, separated by broader rounded furrows. Both ridges and furrows bear numerous flattened radial ridges separated by linear grooves; the ridges, in well-preserved specimens, are serrate or granular. At distant intervals a few well-marked growth-ridges occur.

Measurements:

	(1)	(2)
Length	49	70 mm.
Height	54	78 „

(1, 2) Upper Greensand, Devizes.

Affinities.—This species is distinguished from *L. canalifera* (p. 1) by the valves being more compressed, the ribs fewer in number, the grooves relatively broader, and by the presence of fine radial ornamentation on the ribs and grooves.

Remarks.—This appears to be a rare species in England. The specimens from Devizes are in the Museum of Practical Geology. The specimen from Humble Rocks was collected by Mr. Jukes-Browne, and is now in the Sedgwick Museum.

Type.—From the Cenomanian of Coudrecieux, Sarthe.

Distribution.—Upper Greensand (zone of *Schlœnbachia rostrata*) of Devizes. Base of Chalk Marl (Bed 10) of Humble Rocks, West of Lyme Regis.

LIMA VECTENSIS, sp. nov. Plate II, figs. 2, *a*—*c*.

Description.—Shell large, rather compressed, ovate, height greater than length; antero-dorsal margin straight, the remainder forming a regular curve. Anterior area deeply depressed. Apical angle apparently about 100°. Anterior ear small; posterior ear larger, with a few ribs.

Ornamentation consists of about 40 rather strong, narrow ribs, with rounded summits which, in places, are slightly tubercular. The ribs are closer together on the anterior part of the valves than elsewhere. The interspaces are much broader than the ribs, and are flat or slightly concave; they are marked by numerous fine, concentric ridges.

Affinities.—This species resembles *Lima Dujardini*, Deshayes,[1] from the Senonian, but the interspaces are flat or nearly flat instead of concave, and the well-marked scale-like projections which, in *L. Dujardini*, are placed at intervals on the ribs, but without a concentric arrangement, are not seen.

[1] Dujardin, 'Mém. Soc. géol. de France,' vol. ii (1837), p. 227, pl. xvi, fig. 3. D'Orbigny, 'Terr. Crét.,' vol. iii (1847), p. 569, pl. ccccxxvii, figs. 1—4.

Remarks.—I have seen one example only; it consists of both valves, but with the posterior margin imperfect.

Type.—In the Museum of the Ventnor Institute.

Distribution.—Upper Greensand, chert beds (zone of *Pecten asper*) of the Isle of Wight.

LIMA SUBOVALIS, *Sowerby*, 1836. Plate II, figs. 3, 4*a*, *b*, 5*a*, *b*, 6*a*, *b*, 7 *a*, *b*.

1836.	LIMA ? SUBOVALIS, *J. de C. Sowerby.*	Trans. Geol. Soc., ser. 2, vol. iv, pp. 359, 342, pl. xvii, fig. 21.
1839.	— ASPERA, *H. B. Geinitz.*	Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. 1, p. 23 (*partim*).
? 1847.	— SUBOVALIS, *A. d'Archiac.*	Mém. Soc. géol. de France, ser. 2, vol. ii, p. 309.
—	— ORNATA, *A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 551, pl. cccxxi, figs. 6—10.
1850.	— — —	Prodr. de Pal., vol. ii, p. 167.
—	— — *H. B. Geinitz.*	Das Quadersandst. oder Kreidegeb. in Deutschland, p. 192.
1867.	— — *E. Guéranger.*	Album Paléont. de la Sarthe, p. 19, pl. xxiv, figs. 7, 12.
1869.	— SUBOVALIS, *F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 168.
1870.	— ORNATA, *Pictet and Campiche.*	Ibid., pp. 169, 173.
1871.	RADULA (ACESTA) ORNATA, *F. Stoliczka.*	Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.
1872.	LIMA ORNATA, *H. B. Geinitz.*	Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 1), p. 205, pl. xlii, figs. 16, 17.
? 1877.	— — *A. Peron.*	Bull. Soc. géol. de France, ser. 3, vol. v, p. 502.
1877.	— RAULINIANA, *A. J. Jukes-Browne.*	Quart. Journ. Geol. Soc., vol. xxxiii, p. 502, pl. xxi, fig. 2.
1893.	— ORNATA, *R. Michael.*	Zeitschr. d. deutsch. geol. Gesellsch., vol. xlv, p. 234.
Non 1852.	— — *A. Buvignier.*	Statist. géol., etc., de la Meuse, Atlas, p. 23, pl. xviii, figs. 17—19.

Description.—Shell compressed, ovate or subtrigonal, oblique, considerably higher than long, with the ventral and posterior margins rounded. Apical angle about 74°. Umbones small, close together. Anterior area rather small, depressed, limited by a ridge, ornamented with ribs separated by broader grooves.

Ornamentation consists of numerous (65 to 70) fairly strong, rounded ribs of

nearly equal size, but sometimes (chiefly near the posterior border) with smaller intercalated ribs. The ribs diverge slightly from a nearly median line, and bear short spiny or scaly projections at regular intervals but not usually with a concentric arrangement. The spines are rather nearer the inner than the outer side of each rib. The grooves are narrow near the umbo but become broader in passing ventrally, and at the ventral margin may exceed the ribs in breadth. The grooves are rounded and (in some specimens) show transverse ridges. More or less distinct growth-lines occur at intervals.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)
Length	25	21	20	17	16	14 mm.
Height	34	28	29	23	23	20 ,,

(1, 3) Cambridge Greensand.
(2) Base of Chalk Marl, Folkestone.
(4, 5) Upper Greensand, Warminster.
(6) ,, ,, Haldon.

Affinities.—This species belongs to the same group as the Senonian forms *L. Dunkeri*, Hagenow,[1] and *L. muricata*, Goldfuss.[2] It is distinguished from the former by its smaller apical angle and by the spines on the ribs being placed more closely together. *L. muricata* differs from *L. subovalis* in having fewer ribs with their ornamentation developed into long scale-like projections, and in having oblique grooves in the interspaces.

Remarks.—A comparison of the type of *Lima subovalis* with examples of *L. ornata* leaves no doubt as to their identity. The type-specimen of the former is somewhat worn, but sufficiently well-preserved for identification, and another specimen on the same tablet shows the ornamentation quite clearly; the shell is not silicified, so that it was evidently not obtained from Blackdown—the locality given by Fitton—but it has all the appearance of specimens found at Warminster.

The examples from the Cambridge Greensand were referred to *L. Rauliniana*, d'Orbigny,[3] by Mr. Jukes-Browne. The interior of these is filled with phosphate, and the shell, although in some respects well-preserved, is rather abraded, so that the remains of the spines usually appear as notches on the inner side (that facing the median line) of each rib. The transverse ornamentation in the grooves is often very distinct. Mr. Jukes-Browne has recently re-examined these specimens and agrees with me in thinking that they cannot be separated from *L. subovalis*. I

[1] 'Neues Jahrb. für Min., etc.' (1842), p. 556; Vogel, 'Holländ. Kreide' (1895), p. 17, pl. i, fig. 9; Ravn, 'Mollusk. Danmarks Kridtaflej.' (1902), p. 100, pl. ii, fig. 14.

[2] 'Petref. Germ.,' vol. ii (1836), p. 89, pl. ciii, fig. 4; Vogel, *op. cit.*, p. 17, pl. i, figs. 10, 11.

[3] 'Pal. Franç. Terr. Crét.,' vol. iii (1847), p. 542, pl. cccxvii, figs. 5—8; 'Prodr. de Pal.' (1850), vol. ii, p. 138; Pictet and Campiche, "Foss. Terr. Crét. Ste. Croix" ('Matér. Pal. Suisse,' ser. 5, 1869), p. 154, pl. clxvi, fig. 2.

have not been able to obtain specimens of *L. Rauliniana*, but it seems to differ from *L. subovalis* in having a larger posterior ear and in other characters.

Types.—In the Bristol Museum (No. 1778), from the Upper Greensand, probably of Warminster. The type of *L. ornata* is from the Cenomanian of Le Mans. The specimen from the Cambridge Greensand figured by Jukes-Browne is in the Sedgwick Museum, Cambridge.

Distribution.—Upper Greensand (zone of *Schlœnbachia rostrata*) of Haldon. Upper Greensand (zone of *Pecten asper*) of North Dorset, and Warminster. Cambridge Greensand (derived). Rye Hill Sand of Maiden Bradley. Chloritic Marl of Rocken End (Isle of Wight). Base of Chalk Marl (Greensand bed) of Folkestone. Also recorded by the Geological Survey from the Cenomanian of Devon and Chard.

LIMA SCABRISSIMA, sp. nov. Plate II, figs. 8*a*, *b*, 9*a*, *b*.

Description.—Shell compressed, ovate, height greater than length; antero-dorsal margin rather short, straight or slightly concave, ventral and posterior margins forming a regular curve. Anterior area much depressed, sharply limited, nearly smooth or with faint ribs. Apical angle about 92°. Posterior ear of moderate size, with distinct growth-lines; anterior ear small.

Ornamentation consists of a large number of narrow, rounded, more or less undulating ribs separated by broader grooves. The ribs are generally of nearly equal size, but smaller ones may be intercalated in the grooves. At regular intervals the ribs bear scales or lappet-like projections which are arranged concentrically and may become vertical at their ends; these scales are continued across the grooves as laminar projections. On the anterior and posterior ribs the "scales" become more pointed.

Measurements:

	(1)	(2)	(3)
Length	54	52	38 mm.
Height	62	58	42 „

(1—3) Upper Greensand, Warminster.

Affinities.—This species is near to *Lima rhotomagensis*, d'Orbigny,[1] from the Cenomanian of Rouen, but is distinguished from it by being much less convex, by having a smaller anterior area and a smaller apical angle, and by the ribs being relatively narrower and the grooves broader.

Types.—In the Museum of Practical Geology.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Warminster.

[1] 'Pal. Franc. Terr. Crét.,' vol. iii (1847), p. 557, pl. ccccxxii, figs. 8—11.

LIMA ASPERA (*Mantell*) 1822. Plate II, figs. 10, 11; Plate III, figs. 1 *a*, *b*, 2–4.

1822. PLAGIOSTOMA ? ASPERA, *G. Mantell.* Foss. S. Downs, p. 129, pl. xxvi, fig. 18.
1854. LIMA ASPERA, *J. Morris.* Cat. Brit. Foss., ed. 2, p. 170.
1870. — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 169.
1871. RADULA (? ACESTA) ASPERA, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 415.
1903. LIMA ASPERA, *A. J. Jukes-Browne.* Cret. Rocks of Britain (Mem. Geol. Survey), vol. iii, p. 450.

Non 1836. — — *A. Goldfuss.* Petref. Germ., vol. ii, p. 90, pl. civ, fig. 4.
— 1839. — — *H. B. Geinitz.* Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. 1, p. 23, pl. xxi, fig. 10.
— 1841. — — *F. A. Römer.* Die Verstein. d. nord-deutsch. Kreidegeb., p. 56.
— 1846. — — *A. E. Reuss.* Die Verstein. der böhm. Kreideformat., pt. 2, p. 34, pl. xxxviii, fig. 17.
— 1847. — — *A. d'Orbigny.* Pal. Franc. Terr. Crét., vol. iii, p. 566, pl. cccxxv, figs. 3—6.
— 1850. — — — Prod. der Pal., vol. ii, p. 248.
— — — — *A. Alth.* Beschreib. d. Umgebung von Lemberg (Haidinger's Naturwiss. Abhandl., vol. iii, pt. 2), p. 243.
— 1863. — — *A. v. Strombeck.* Zeitschr. d. deutsch. geol. Gesellsch., vol. xv, p. 150.
— 1869. — — *E. Favre.* Moll. Foss. de la Craie de Lemberg, p. 135.
— 1870. — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), pp. 171, 173.
— 1877. — — *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: II, Die Weissenberg. u. Malnitz. Schicht., p. 132, fig. 118.
— 1883. — — — Ibid., III, Die Iserschicht., p. 114.
— 1887. — — *A. Peron.* L'Hist. Terr. de Craie (Bull. Soc. Sci. hist. et nat. de l'Yonne, ser. 3, vol. xii), p. 150.
— 1889. — (PLAGIOSTOMA) ASPERA, *O. Griepenkerl.* Senon. von Königslutter (Palæont. Abhandl., vol. iv), p. 40.
— 1898. — ASPERA, *G. Müller.* Mollusk. Untersen. v. Braunschweig u. Ilsede (Abhandl. d. k. preussisch. geol. Landesanst., N.F., Heft 25), p. 26, pl. iv, fig. 5.
— 1900. — — *C. Gagel and F. Kaunhowen.* Jahrb. d. k. preussisch. geol. Landesanst. für 1899, p. 232.

Description.—Shell ovate, higher than long, outline rounded, with the antero-dorsal and postero-dorsal margins straightened; convexity small. Umbones small, pointed, close together, apical angle 80° to 90°. Anterior area deep, narrow.

Anterior ears triangular, rather small; posterior ears obtusely triangular, elongate, with radial ribs.

Valves ornamented with numerous flattened ribs arranged on either side of a line passing from the umbo to the ventral margin, from which they diverge slightly. The ribs are nearly straight or slightly undulating, but are often bent abruptly where they cross growth-lines. Surface of ribs nearly smooth, but sometimes showing very fine concentric ridges or (when worn) oblique striæ. On the inner edge of each rib—that facing the middle line—there are short, slit-like indentations, above each of which a short spiny projection is seen in perfectly preserved specimens. These slits and spines do not, as a rule, show a concentric arrangement. The grooves separating the ribs are very narrow and are marked with pits near the umbo and with transverse grooves ventrally. Sometimes near the margins of the valves new ribs are intercalated or old ones bifurcate.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Length	31	30	28	26	24	19	16	mm.
Height	36	33	33	35	26	23	21	,,
Number of ribs	66	41	60	46	42	41	52	

(1, 2, 3, 7) Totternhoe Stone, Burwell.
(4) ,, ,, Cherry Hinton.
(5, 6) Chalk Marl, Folkestone.

Affinities.—The Senonian form figured as *Lima aspera* by Goldfuss, Reuss, and Fritsch is clearly distinguished from this species by the chevron-like ornamentation on the ribs. Pictet and Campiche suggest that Goldfuss' species may be identical with *Lima Dunkeri*, Hagenow,[1] from Rügen, but this view is not supported by the figures given by Vogel and Ravn. The form figured by d'Orbigny has a larger apical angle than *L. aspera*, Mantell, and does not show the spiny projections on one side of the ribs.

The example figured by Reuss[2] as *Lima plana* is similar in form to *L. aspera*, Mantell, but does not appear to possess the spiny projections on the ribs.

Types.—I have not been able to find the types.[3] They came from the Chalk Marl of Hamsey and Stoneham.

Distribution.—Chloritic Marl of Eastbourne. Chalk Marl of Folkestone, and Blue Bell Hill (Burham). Totternhoe Stone of Arlesey, Burwell, Cherry Hinton, and Stoke Ferry.

[1] 'Neues Jahrb. für Min.,' etc. (1842), p. 556.

[2] 'Verstein. böhmisch. Kreideformat.' (1846), p. 35, pl. xxxviii, fig. 20.

[3] The name *aspera* was used by Chemnitz (1784) for a recent species of *Lima*, but since that has been shown to be a synonym of *Lima scabra* (Born, 1780) there does not appear to be sufficient reason for giving a new name to the Chalk species which, for over eighty years, has been known as *Lima aspera*, Mantell.

Sub-genus—Plagiostoma, *J. Sowerby*, 1814.

('Min. Conch.,' vol. i, p. 175.)

Lima (Plagiostoma) subrigida, *Römer*, 1836. Plate III, figs. 5*a*, *b*, 6—9. Text-figs. 1, 2, 3.

1836. Lima subrigida, *F. A. Römer*. Verstein. nord-deutsch. Oolithen-geb., p. 79, pl. xiii, fig. 16.
— — plana, *Römer*. Ibid., p. 80, pl. xiii, fig. 18.
1841. — subrigida, *Römer*. Die Verstein. d. nord-deutsch. Kreidegeb., p. 57.
— — plana, *Römer*. Ibid., p. 57.
1877. — subrigida, *G. Böhm*. Zeitschr. d. deutsch. geol. Gesellsch., vol. xxix, p. 235.
1896. — — *A. Wollemann*. Ibid., vol. xlviii, p. 836.
1900. — — *Wollemann*. Die Biv. u. Gastrop. d. deutsch. u. holländ. Neocoms (Abhandl. d. k. preussich. geol. Land., N.F., pt. 31), p. 30.

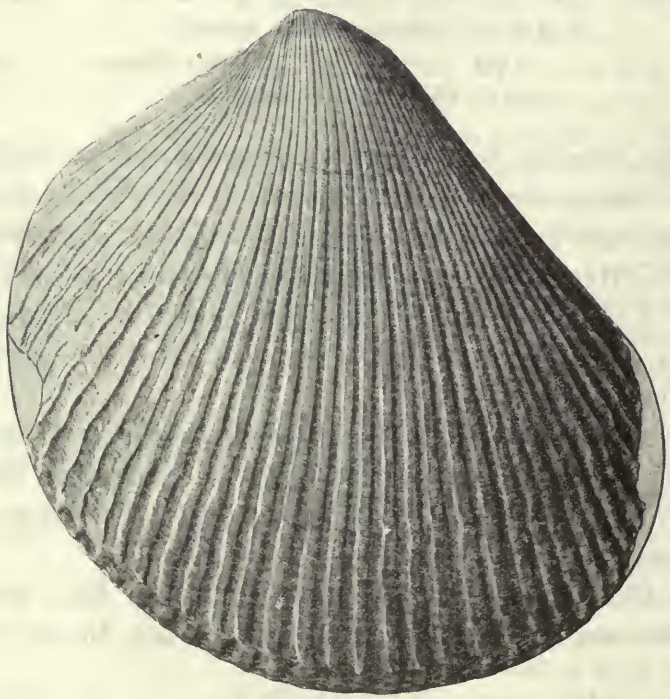

Fig. 1.—*Lima* (*Plagiostoma*) *subrigida*, Römer. Claxby Ironstone, Lincolnshire. Right valve. Natural size. Sedgwick Museum, Cambridge.

Description.—Shell convex, oval, height slightly greater than length; antero-dorsal margin nearly straight, postero-dorsal much shorter and nearly straight, the remainder rounded and forming a regular curve. Apical angle rather more than a

right angle. Umbones of moderate size. Area large, with a large triangular ligament pit near the middle but bending posteriorly. Anterior area large, deeply depressed, especially near the ears. Ears rather large, the anterior triangular, the posterior rather larger, more elongate; surface with growth-lamellæ only.

Surface ornamented with numerous (43 to 52) radial ribs, which are straight or slightly undulating. The ribs are flattened; near the umbo they are separated by narrow grooves, but in passing ventrally the grooves increase in width and become as wide as or wider than the ribs. The grooves are rather shallow and rounded. The anterior and posterior ribs are narrower than the others. Near the umbo the grooves are punctate, but in passing ventrally the pits soon become replaced by

Fig. 2.—*Lima* (*Plagiostoma*) *subrigida*, Römer. Claxby Ironstone, Benniworth Haven. Right valve. Natural size. Sedgwick Museum.

transverse furrows separated by ridges, and the latter may pass on to the ribs. On the anterior area ribs are small or absent, but growth-lines are usually distinct.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Length . .	109	100	80	73	72	64	63	38	31	mm.
Height . .	114	108	85	79	76	65	65	36	40	,,
Thickness . .	—	63	—	—	—	—	36	—	—	,,
Number of ribs .	48	49	48	51	46	43	52	52	44	

(1—9) Claxby Ironstone, Benniworth Haven.

Affinities.—L. vigneulensis, Pictet and Campiche,[1] is distinguished from *L. subrigida* by its more quadrilateral outline, more numerous ribs and finer

[1] 'Terr. Crét. Ste. Croix' (1869), p. 138, pl. clxii, figs. 5—8.

grooves, and also by the earlier part of the shell being nearly smooth. *L. aubersonensis*, Pictet and Campiche,[1] is relatively longer and has narrower grooves.

Remarks.—On account of the imperfect figures of *L. subrigida* given by Römer, the English specimens have not hitherto been referred to that species; they agree perfectly with the descriptions except in the number of ribs, but Dr. Wollemann informs me that that character is variable. I have sent a specimen from the Claxby Ironstone to Dr. Wollemann, and he is able to confirm my identification of the species. Specimens from the Speeton Clay differ from those found in Lincolnshire in having fewer ribs with relatively fewer grooves, but since this is a very variable character it cannot be regarded as indicative of more than a local variety.

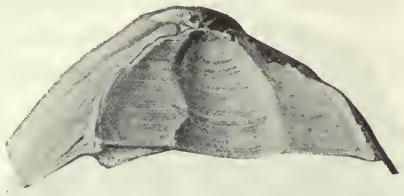

Fig. 3.—*Lima* (*Plagiostoma*) *subrigida*, Römer. Claxby Ironstone, Benniworth Haven. Area of right valve. × ⅔. Sedgwick Museum.

Types.—From the Hilsthon of Brunswick.

Distribution.—Claxby Ironstone (zone of *Belemnites lateralis*) of Benniworth Haven. Upper part of the Speeton Clay of Speeton.

Lima (Plagiostoma), sp. cf. Orbignyana, *Matheron*, 1842. Plate III, figs. 10, *a*—*c*.

1842.	Lima Orbignyana,	*P. Matheron.*	Cat. Foss. des. Bouches-du-Rhone, p. 182, pl. xxix, figs. 3, 4.
1846.	—	—	*A. d'Orbigny.* Pal. Franç. Terr. Crét., vol. iii, p. 530, pl. cccxv, figs. 1—4.
1850.	—	—	*d'Orbigny.* Prodr. de Pal., vol. ii, p. 107.
1855.	—	—	*G. Cotteau.* Moll. Foss. de l'Yonne, p. 100.
1865.	—	—	*H. Coquand.* Mon. Aptien de l'Espagne, p. 149.
1866.	—	—	*P. de Loriol.* Foss. Oolith. Corall. Valang. et Urgon. Mt. Salève, p. 82, pl. D, fig. 13.
1867.	—	—	*de Loriol*, in *Favre.* Rech. géol. Sans Savoie, vol. i, p. 387, pl. C, fig. 24.
1869.	—	—	*F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 126, pl. clxi, fig. 4.
1871.	Radula (Acesta) Orbignyana,		*F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.

[1] Loc. cit., p. 140, pl. clxiv, figs. 1, 2.

Description.—Shell moderately convex, oval, higher than long, ventral and posterior margin rounded. Umbones sharp. Apical angle about 83°. Anterior area depressed, limited by a rounded edge, ornamented with ribs. Ears with distinct growth-ridges. Posterior ear higher than long, and larger than the anterior ear.

Ornamentation consists of about 52 flattened ribs, slightly undulating, separated by very narrow grooves with pits. Near the ventral margin the ribs become divided by a median groove. Near the anterior and posterior margins the ribs are rather narrower than elsewhere. A few moderately distinct growth-lines occur.

Measurements:

Length	20 mm.
Height	25·5 „

Affinities.—This is distinguished from *L. villersensis* (see below) by its more numerous and narrower ribs.

Remark.—I have seen one specimen only, which is preserved in the British Museum, No. L 15754.

Distribution.—Lower Greensand (Ferruginous Sands) of Shanklin.

LIMA (PLAGIOSTOMA) VILLERSENSIS? *Pictet and Campiche*, 1869. Plate III, figs. 11*a*, 11*b*, 12*a*, *b*, 13.

? 1869. LIMA VILLERSENSIS, *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), pp. 127, 162, pl. clxi, fig. 5.

Description.—Shell moderately convex, oval, higher than long, ventral and posterior margins rounded. Umbones sharp. Apical angle about 85°. Anterior area depressed, bounded by a sharp edge. Posterior ear larger than the anterior, higher than long, with the outer angle obtuse, and with a few radial ribs.

Ornamentation consists of from 32 to 36 broad, flattened, nearly straight ribs, separated by linear grooves with distinct pits. Near the anterior, and sometimes near the posterior border, the ribs become narrower. A few well-marked growth-ridges may occur at distant intervals. Near the ventral margin of the valves (ventral to a growth-ridge) the position of the ribs is sometimes slightly shifted, and the number of ribs may increase owing to the fission of some.

Measurements:

	(1)	(2)	(3)	(4)
Length .	20	19	18	14 mm.
Height .	26·5	25	22	17 „

(1—4) Lower Greensand, Faringdon.

Affinities.—I have seen only a few examples of this form. They agree with *L. villersensis* except in having a rather smaller apical angle. In this respect they resemble *L. Orbignyana*, Matheron (see above), but they differ from that species in possessing fewer and straighter ribs. I have not seen any undoubted example of *L. villersensis* and am unable to state whether the apical angle is constantly larger than in the English specimens. Pictet and Campiche say that it is about 95°, but the specimen they figure possesses an apical angle of 90° only. In the English specimens it is about 85°.

This is the form which was referred by Sharpe[1] to *L. consobrina*, d'Orbigny, but it possesses considerably fewer ribs than that species.

Type.—*L. villersensis* is found in the Valanginian of Ste. Croix.

Distribution.—Lower Greensand of Faringdon.

LIMA (PLAGIOSTOMA) SEMIORNATA, *d'Orbigny*, 1847. Plate III, figs. 14, 15, 16*a*, *b*. Plate IV, fig. 1.

1847. LIMA SEMIORNATA, *A. d'Orbigny*. Pal. Franç. Terr. Crét., vol. iii, p. 555, pl. cccxxii, figs. 1—3.
1850. — — *d'Orbigny*. Prodr. de Pal., vol. ii, p. 167.
1867. — — *E. Guéranger*. Album Paléont. de la Sarthe, p. 19, pl. xxiv, fig. 13.
1870. — — *F. J. Pictet and G. Campiche*. Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 169.
1871. RADULA (PLAGIOSTOMA) SEMIORNATA, *F. Stoliczka*. Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.
? 1885. — — — *F. Nötling*. Die Fauna d. baltisch. Cenoman. (Palæont. Abhandl., vol. ii), p. 15, pl. ii, fig. 4.

Description.—Shell compressed, rounded, height and length nearly equal. Antero-dorsal border straight or slightly concave. Umbones close together. Anterior area depressed, with a sharp edge. Apical angle 120°.

Surface nearly smooth, shiny, with numerous, very fine, regular, concentric linear ridges, and with radial punctate grooves near the umbo and near the anterior and posterior margins. The grooves near the anterior margin are fewer and more widely separated than those near the posterior margin.

[1] 'Quart. Journ. Geol. Soc.,' vol. x (1853), p. 193 (*sub-consobrina*, d'Orbigny, 'Prodr. de Paléont.,' (1850), p. 167).

Measurements :

	(1)	(2)	(3)	(4)	(5)
Length	32	31	29	29	23 mm.
Height	33	32	29	26	23 „

(1, 2) Upper Greensand, Potterne.
(3, 5) „ „ Ventnor.
(4) „ „ Blackdown.

Affinities.—This species is distinguished by its compressed valves and rounded outline.

Type.—From the Cenomanian of Le Mans.

Distribution.—Upper Greensand (zone of *Schlœnbachia rostrata*) of Potterne (Devizes) and Blackdown. Upper Greensand (zone of *Pecten asper*) of Ventnor. Chalk Marl of Folkestone.

LIMA (PLAGIOSTOMA) MEYERI, sp. nov. Plate IV, figs. 2,3. Text-fig. 4.

1896. LIMA SIMPLEX, *A. J. Jukes-Browne.* Quart. Journ. Geol. Soc., vol. lii, p. 152.

Description.—Shell ovate or subtrigonal, much compressed, a little higher than long, oblique, considerably inequilateral; antero-dorsal margin long and

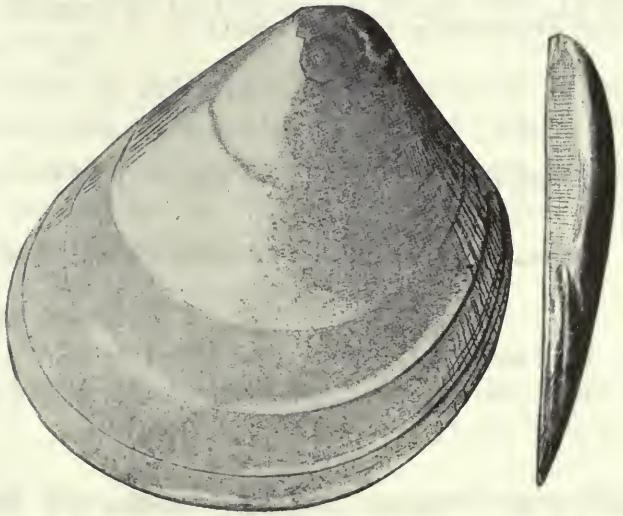

FIG. 4.—*Lima (Plagiostoma) Meyeri*, sp. nov. Upper Greensand, Warminster. Museum of Practical Geology, No. 8838. Left valve and antero-dorsal view. Natural size.

straightened, ventral and postero-ventral margins rounded. Umbones small, close together. Apical angle from 90° to 100°. Anterior area depressed, long and narrow, with a few radial ribs and vertical grooves. Posterior ear small; anterior ear not seen.

Ornamentation consists of narrow, linear, shallow, pitted grooves which may

be confined to the anterior and posterior parts of the valves or may extend over the whole surface. The grooves are somewhat irregular and the interspaces are broad and flattened. At distant intervals a few well-marked growth-rings occur, beyond which, in some cases, the ribs cease.

Measurements:

	(1)	(2)	(3)	(4)	(5)
Length	69	53	48	42	34 mm.
Height	71	56	52	47	37 „

(1—5) Upper Greensand, Warminster.

Affinities.—This species differs from *Lima semiornata* (p. 14) in being larger, relatively higher, more trigonal in outline, and in having the radial grooves more extensively developed. It is distinguished from *Lima simplex*, d'Orbigny,[1] in being much less convex, in the height being relatively less, the antero-dorsal margin shorter, the anterior area smaller, and the anterior grooves less prominent.

The shell is relatively longer and the apical angle larger than in *L. sub-consobrina*, d'Orbigny.[2] It is also relatively longer, with a longer antero-dorsal margin and the radial grooves less well developed, than in *L. cretacea* (p. 22).

Types.—From Warminster. In the Museum of Practical Geology.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Warminster. Rye Hill Sands and Chloritic Marl of Maiden Bradley. Cenomanian (Meÿer's Beds 10 and 11) of Hooken and Dunscombe (Devon coast).

LIMA (PLAGIOSTOMA) GLOBOSA (*Sowerby*), 1836. Plate IV, figs. 4 *a*—*c*, 5 *a*, *b*, 6 *a*—*c*.

1836. LUCINA? GLOBOSA, *J. de C. Sowerby*. Trans. Geol. Soc., ser. 2, vol. iv, p. 335, pl. xi, fig. 2 (non *Lucina globosa*, Römer, 1839).
1854. LIMA GLOBOSA. *J. Morris*. Cat. Brit. Foss., ed. 2, p. 171.
1895. — — *E. Tiessen*. Zeitschr. der deutsch. geol. Gesellsch., vol. xlvii, p. 473.

Description.—Shell very convex, of moderate size, oval, length considerably greater than height, outline rounded with the antero-dorsal margin long and straightened. Umbones incurved, blunt. Apical angle about 118°. Anterior area large, very deep, limited by a sharp edge, with radial ribs. Ears small.

Surface of valves polished, with faintly-marked growth-lines at intervals;

[1] 'Pal. Franç. Terr. Crét.,' vol. iii (1847), p. 545, pl. ccccxviii, figs. 5—7.

[2] Ibid., p. 556, pl. ccccxxii, figs. 4—7; *L. sub-consobrina*, d'Orbigny, 'Prodr. de Palćont.,' vol. ii (1850), p. 167.

ornamented with numerous pits having a regular radial and concentric arrangement and giving rise (in some cases) to the appearance of slightly-raised radial and concentric ribs. Near the ventral margin the pits become more elongated (parallel with the margin) and their concentric arrangement may become wavy or irregular. At the anterior and posterior margins the radial arrangement is often more distinct than elsewhere. Sometimes on the median part of the valve the concentric arrangement alone can be recognised.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Length	31	27	25	24	22	20	18	12	mm.
Height	25	23	21	21	19	17	16	10	„

(1—3, 5, 7, 8) Totternhoe Stone, Burwell.
(4) Chalk Marl, Ventnor.
(6) „ „ Clevancy.

Affinities.—This species closely resembles *Lima albensis*, d'Orbigny,[1] from the Gault of Ervy (Aube), Machéroménil (Ardennes), the Perte-du-Rhône, etc. I have not seen any specimens of *L. albensis*, but it appears to differ from *L. globosa* in the absence of the punctate ornamentation and in having a smaller apical angle.

L. globosa is distinguished from *L. Hoperi* (see below) by its smaller size, more inflated valves, and by the close-set rows of radial and concentric pits.

Type.—In the Museum of the Geological Society, No. 1538, from the Chloritic Marl of the Isle of Wight.

Distribution.—Gault of Folkestone. Red Limestone of Hunstanton. Upper Greensand of Warminster. Cambridge Greensand (base of Chalk Marl). Chalk Marl of Ventnor, Clevancy, Chilcomb well (Winchester), Burham, Folkestone and Cherry Hinton. Cenomanian of Wilmington. Totternhoe Stone of Burwell. Zone of *H. subglobosus* of Chilcomb and Fulbourn.

LIMA (PLAGIOSTOMA) HOPERI, *Mantell*, 1822. Plate IV, figs. 7, 8*a*, *b*, 9*a*, *b*, 10, 11*a*, *b*, 12*a*, *b*.

1822. PLAGIOSTOMA HOPERI, *G. Mantell.* Foss. S. Downs, p. 204, pl. xxvi, figs. 2, 3, 15.
— — — *J. de C. Sowerby.* Min. Conch., vol. iv, p. 111, pl. cccl xxx.

[1] 'Pal. Franç. Terr. Crét.,' vol. iii (1847), p. 541, pl. cccxvi, figs. 15, 16; 'Prodr. de Paléont.,' vol. ii (1850), p. 138; Pictet and Roux, 'Moll. Foss. Grès verts de Genève' (1852), p. 488, pl. xl, fig. 9; Pictet and Campiche, "Foss. Terr. Crét. Ste. Croix" ('Matér. Pal. Suisse,' ser. 5, 1869), p. 160.

1822. Plagiostoma Mantelli, *A. Brongniart.* Descript. géol. envir. de Paris. In *Cuvier's* Ossem. Foss., vol. ii, pt. 2, p. 600, pl. iv, fig. 3.

1825. Pachytos Hoperi, *M. J. L. Defrance.* Dict. Sci. nat., vol. xxxvii, p. 207.

1827. Plagiostoma punctatum, *S. Nilsson.* Petrif. Suecana, p. 24, pl. ix, fig. 1.

1832. Lima Hoperi, *G. P. Deshayes.* In *J. G. Bruguière*, Hist. nat. des Vers et des Moll. (Encyc. méthod.), vol. ii, p. 349.

1836. — Mantellii, *A. Goldfuss.* Petref. Germ., vol. ii, p. 92, pl. civ, fig. 9.

— — Hoperi, *Goldfuss.* Ibid., p. 91, pl. civ, fig. 8.

— — — *Lamarck.* Anim. sans Vert. (ed. 2 by Deshayes and Milne-Edwards), vol. vii, p. 120.

1837. Plagiostoma punctatum, *W. Hisinger.* Lethæa Suecica, p. 54 (*not* pl. xv, fig. 3).

1838. Lima Hoperi, *H. G. Bronn.* Lethæa Geognost., vol. ii, p. 682, pl. xxxii, fig. 8.

1839. — — *H. B. Geinitz.* Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. 1, p. 24 (? *partim*).

1841. — Mantellii, *F. A. Römer.* Die Verstein. d. nord-deutsch. Kreidegeb., p. 58.

— — Hoperi, *Römer.* Ibid., p. 58.

— — Nilssoni, *Römer.* Ibid., p. 57.

1842. — Goldfussi, *F. v. Hagenow.* Neues Jahrb. für Min., etc., p. 555.

? 1846. — Mantelli, *H. B. Geinitz.* Grundr. d. Verstein., p. 472, pl. xx, fig. 13.

— — Hoperi, *Geinitz.* Ibid., p. 473, pl. xx, fig. 14.

— — — *A. E. Reuss.* Die Verstein. der böhm. Kreideformat., pt. 2, p. 34, pl. xxxviii, figs. 11, 12.

1847. — Sowerbyi, *J. Müller.* Petref. der Aachen. Kreidef., pt. 2, p. 67.

1850. — Hoperi, *H. B. Geinitz.* Das Quadersandst. oder Kreidegeb. in Deutschland, p. 192.

— — Sowerbyi, *Geinitz.* Ibid., p. 192.

— — Hoperi, *A. Alth.* Geogn.-palæont. Beschreib. von Lemberg (Haidinger's Naturwiss. Abhandl., vol. iii, pt. 2), p. 240.

? — — Mantelli, *R. Kner.* Verstein. v. Lemberg (Haidinger's Naturwissensch. Abhandl., vol. iii, pt. 2), p. 29.

— Plagiostoma Hoperi, var., *J. de C. Sowerby*, in *F. Dixon.* Geol. Sussex, pp. 348, 356 (p. 383, ed. 2), pl. xxviii, fig. 21.

1851–2. Lima Sowerbyi, *H. G. Bronn.* Lethæa Geogn., ed. 3, vol. ii, pt. 5, p. 278, pl. xxxii, fig. 8.

? 1852. — Hoperi, *R. Kner.* Denkschr. d. k. Akad. d. Wissensch. Wien, Math.-nat. Cl., vol. iii, p. 318.

1854. — — *J. Morris.* Cat. Brit. Foss., ed. 2, p. 171 (*partim*).

1863. — — *S. Placketko.* Das Becken von Lemberg (Jahresber. d. k. k. zweit. Ober-gymnas. in Lemberg, 1863), p. 19.

— — — *A. von Strombeck.* Zeitschr. d. deutsch. geol. Gesellsch., vol. xv, p. 148.

— — — *R. Drescher.* Ibid., p. 355.

1869. — — *E. Favre.* Moll. Foss. de la Craie de Lemberg, p. 137, pl. xii, fig. 19.

1870. LIMA HOPERI, *F. Römer.* Geol. von Oberschles., p. 315, pl. xxxiv, fig. 10.
— — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér Pal. Suisse, ser. 5), pp. 171, 173.
— — SOWERBYI, *Pictet and Campiche.* Ibid., p. 173.
1872. — — *H. B. Geinitz.* Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 2), p. 41, pl. ix, figs. 13, 14.
1877. — — *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 133, fig. 120.
1882. — HOPERI, *H. Schröder.* Zeitschr. der deutsch. geol. Gesellsch., vol. xxxiv, p. 263.
1883. — SOWERBYI, *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: III, Iserschicht., p. 115, fig. 87.
1888. — HOPERI, *A. Peron.* L'Hist. Terr. de Craie, p. 149.
1889. — (PLAGIOSTOMA) HOPERI. *O. Griepenkerl.* Senon. v. Königslutter (Palæont. Abhandl., vol. iv), p. 40.
— — HOPERI, *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: IV, Teplitz. Schicht., p. 84, fig. 78.
— — — *E. Holzapfel.* Die Mollusk. Aachen. Kreide (Palæontographica, vol. xxxv), p. 240, pl. xxvii, fig. 5.
1892. — (PLAGIOSTOMA) HOPERI, *E. Stolley.* Die Kreide Schleswig-Holsteins (Mittheil. a. d. Mineralog. Instit. Univ. Kiel, vol. i), p. 237.
1893. — HOPERI, *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: V, Priesener Schicht., p. 100.
1894. — — *B. Lundgren.* Mollusk. i *Mammillatus-* och *Mucronata-*zonerna (K. Svenska Vet. Akad. Handl. N. F., vol. xxvi, No. 6), p. 42.
1897. — — *R. Leonhard.* Kreideformat. in Oberschles. (Palæontographica, vol. xliv), p. 46.
— — — *A. Hennig.* Revis. Lamellibr. i Nilsson's 'Petrific. Suecana,' (K. Fysiogr. Sällsk. i Lund. Handl., N. F., vol. viii), p. 30, pl. ii, fig. 13.
— — (PLAGIOSTOMA) HOPERI, *H. Woods.* Quart. Journ. Geol. Soc., vol. liii, p. 383.
1898. — HOPERI, *G. Müller.* Mollusk. Untersen. v. Braunschweig u. Ilsede, p. 24, pl. iv, fig. 12.
1901. — — *A. Wollemann.* Jahrb. d. k. preussisch. geol. Landesanst. für 1900, vol. xxi, p. 15.
1902. — — *A. Wollemann.* Lüneburg. Kreide (Abhandl. d. k. preussisch. geol. Landesanst., N. F., Heft 37), p. 58.
— — — *J. P. J. Ravn.* Mollusk. Danmarks Kridtaflej.: I, Lamellibr. (K. Danske Vid. Selsk. Skrift. 6 Række, nat. og math. Afd., vol. xi), p. 99, pl. ii fig. 18.

Non 1847. — — *A. d'Orbigny.* Pal. Franç. Terr. Crét., vol. iii, p. 564, pl. ccccxxiv, figs. 10—13.
— 1847. — Mantelli, *d'Orbigny.* Ibid., p. 568, pl. ccccxxvi, figs. 3—5.
— 1850. — Hoperi, *d'Orbigny.* Prodr. de Pal., vol. ii, p. 248.
— — — Mantelli, *d'Orbigny.* Ibid., p. 248.
— 1877. — Hoperi, *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 134, fig. 121.
— — — Mantelli, *Fritsch.* Ibid., p. 134, fig. 122.
— 1872. — Hoperi, *H. B. Geinitz.* Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 2), p. 40, pl. ix, figs. 11, 12.
— 1881. — — *J. Kiesow.* Cenomanverstein. a. d. Diluvium d. Umgeg. Danzig's (Schrift d. naturf. Gesellsch. in Danzig, N. F., vol. v), p. 414, figs. 9, 10.
? — 1893. — sp., cf. Hoperi, *R. Michael.* Zeitschr. d. deutsch. geol. Gesellsch., vol. xlv, p. 234.

Description.—Shell convex, oval, rounded, considerably inequilateral, longer than high. Antero-dorsal margin rather long, slightly convex or nearly straight; postero-dorsal margin rather short; the remainder forming a regular curve. Umbones close together. Apical angle 115° to 117°. Ears rather small, with growth-lines; the posterior longer than high and larger than the anterior ear. Anterior area large, deep, with a more or less sharp border, often with radial grooves which vary in number and are more distinct near the umbo than anteriorly.

Surface of shell nearly smooth. In the region of the umbo numerous linear grooves with pits occur; these may also extend on to the anterior and posterior parts of the shell, and in some cases they are present on the middle of shell, reaching a part of the way or even quite to the ventral margin. The grooves are slightly wavy, sometimes discontinuous, and are deeper near the anterior and posterior margins, and often more widely separated near the former. New grooves are introduced at various distances from the umbo.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
Length	57	57	56	52	51	51	47	41	37	34	31	31	mm.
Height	52	50	52	50	47	46	42	39	32	32	28	26	,,

(1) *M. cor-anguinum* zone, Gravesend.
(2) *Uintacrinus* band, Devizes Road, Salisbury.
(3, 6, 12) *A. quadratus* zone, East Harnham.
(4, 7) *M. cor-anguinum* zone, Gravesend.
(5, 10) *M. cor-anguinum* zone, Northfleet.
(8) Chalk Rock, Underwood Hall, Dullingham.
(9, 11) *B. mucronata* zone, Norwich.

Affinities.—This species was described by Brongniart under the name *Plagiostoma Mantelli* from specimens which were sent to him by Mantell from near

Brighton—probably from Lewes. Mantell[1] regarded *Plagiostoma Mantelli* as a synonym of his *Plagiostoma Hoperi*, and I think there can be no doubt as to the correctness of that view.

Geinitz (1872) considered *Lima Hoperi* of Sowerby to be distinct from *L. Hoperi* of Mantell, thinking that the former (which he named *L. Sowerbyi*) was distinguished by being almost smooth, whereas the latter is covered with radial grooves. The smooth and the grooved forms agree exactly in shape, and between these extremes in ornamentation every gradation may be seen. Moreover, although one of the specimens figured by Mantell (fig. 3) is ornamented all over, the others (figs. 2, 15) possess grooves on the sides only. I think, therefore, that there can be no doubt as to the identity of *L. Hoperi* of Sowerby and *L. Hoperi* of Mantell. Further, it should be noted that Sowerby's specimens were sent to him by Mantell as examples of his *L. Hoperi*.

The specimens figured by Geinitz (1872) as *L. Hoperi* (from the Pläner-kalk of Strehlen) are relatively higher (especially fig. 11) than Mantell's species, and are probably examples of *L. cretacea* (see below).

L. Hoperi of d'Orbigny[2] differs in having a smaller apical angle, in being relatively higher, much compressed, and with the grooves more widely separated. It may, however, be only a variety of *L. Hoperi*, Mantell. I have seen undoubted examples of *L. Hoperi*, Mantell, from the Senonian of Marromme (near Rouen), Lillebonne (Seine-Inférieure), and from other French localities. The form described and figured by d'Orbigny as *L. Mantelli* is referred to below (p. 23).

L. Lamberti of Peron,[3] from the zone of *Micraster breviporus* of Joigny, may be only a variety of *L. Hoperi*. It is stated to differ chiefly in its greater length, but in this respect it can, I think, be matched by some undoubted varieties of *L. Hoperi*.

For the relation of *L. Hoperi* to *L. globosa* see page 17, and to *L. cretacea* see page 23.

Remarks.—This species varies considerably in the extent of the ornamentation. Some examples are smooth, save for the pitted grooves near the umbo; in many cases the grooves are continued on to the sides of the shell; less frequently they extend to the middle of the valve, and may even reach the ventral margin. I have not seen sufficient examples, of which the exact horizons are known, to enable me to determine whether any of the varieties are characteristic of certain zones.

Types.—I have not seen the types. The specimens figured by Sowerby are in the British Museum. The types, and also Sowerby's specimens, came from the Upper Chalk (probably from the zone of *Micraster cor-testudinarium* or the zone of

[1] 'Trans. Geol. Soc.,' ser. 2, vol. iii (1835), p. 206.

[2] See Jukes-Browne, 'Quart. Journ. Geol. Soc.,' vol. lii (1896), p. 152.

[3] 'Hist. Terr. de Craie' (1888), p. 151, pl. ii, fig. 1.

M. cor-anguinum) near Lewes. An example from Cambrai is in the d'Orbigny Collection at Paris, but it is probably not the specimen figured in the 'Paléontologie Française.'

Distribution.—(i) Zone of *Terebratulina* of Bevendean, near Brighton.[1]

(ii) Zone of *Holaster planus* of Winchester, Lewes, Dover, Kenley, Cuxton. Chalk Rock of Boxmoor, Luton, Underwood Hall (Dullingham), Westley Waterless.

(iii) Zone of *Micraster cor-testudinarium* of Lewes, Dover, Purley, Strood, Chatham, Swaffham[2] (Norfolk).

(iv) Zone of *Micraster cor-anguinum* of Winchester, Porton, Witherington, Quidhampton, Lewes, the Sussex coast, St. Margaret's, Gravesend, Northfleet, Halling Pit (South Croydon).

(v) Zone of *Marsupites testudinarius* of the coasts of Sussex, Thanet, and Yorkshire. *Uintacrinus* band of Devizes Road, Salisbury.

(vi) Zone of *Actinocamax quadratus* of East Harnham, Hursley (Winchester), the coasts of Sussex and Yorkshire.

(vii) Zone of *Belemnitella mucronata* of the Dorset coast and Norwich.

(viii) Chalk of Trimingham.

LIMA (PLAGIOSTOMA) CRETACEA, nom. nov. Plate IV, figs. 13, 14 *a*—*c*, 15. Plate V, figs. 1*a*, *b*, 2, 3, 4*a*, *b*.

? 1847.	LIMA MANTELLII,	*A. d'Orbigny.*		Pal. Franç. Terr. Crét., vol. iii, p. 568, pl. ccccxxvi, figs. 3—5 (non *L. Mantelli*, Brongniart).
? 1850.	—	—	—	Prodr. de Pal., vol. ii, p. 248.
—	—	LÆVIUSCULA,	*J. de C. Sowerby*, in	*F. Dixon.* Geol. Sussex, p. 347 (p. 382, ed. 2), pl. xxviii, fig. 14, (non *L. læviuscula*, Sowerby, 1822).
? 1872.	—	HOPERI,	*H. B. Geinitz.*	Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 2), p. 40, pl. ix, figs. 11, 12.
? 1877.	—	—	*A. Fritsch.*	Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 134, fig. 121.
? —	—	MANTELLI,	*Fritsch.*	Ibid., p. 134, fig. 122.
? 1888.	—	—	*A. Peron.*	L'Hist. du Terr. de Craie, p. 151.

Description.—Shell of small convexity, oval, very inequilateral, higher than long. Antero- and postero-dorsal margins nearly straight, the remainder forming a

[1] Also recorded from the *Terebratulina* zone of South Dorset by Dr. Barrois.

[2] This may be from the *M. cor-anguinum* zone.

regular curve. Umbones small, close together. Apical angle usually about 100°, but sometimes only 90°. Ears small, the posterior larger than the anterior. Anterior area of moderate size, very deep, with a sharp edge and numerous radial ribs.

Ornamentation consists of numerous, well-defined, radial grooves with distinct pits, covering the entire surface of the shell. The grooves are straight or slightly wavy, and in some cases are linear, in others broader, the latter giving the appearance of flattened or rounded ribs to the interspaces. The pits in the grooves sometimes extend into the sides of the ribs. New grooves may be introduced near the ventral margin or occasionally near the middle of the valve. In well-preserved specimens very fine concentric ridges are sometimes seen. A few growth-rings are usually present.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Length .	32	32	26	21	21	17	16	12	11	mm.
Height .	37	35	30	24	22	19	19	14	12	,,

(1) *H. planus* zone, Cuxton.
(2) ,, ,, Cheveley.
(3) ,, ,, Borsted.
(4) *A. quadratus* zone, Whaddon railway cutting, near Salisbury.
(5—7) *A quadratus* zone, East Harnham.
(8) *M. cor-anguinum* zone, Witherington.
(9) *Uintacrinus* band, Devizes Road, Salisbury.

Affinities.—This species is distinguished from *Lima Hoperi* by having a smaller apical angle, by being relatively higher and shorter, with the valves less convex, the anterior area relatively smaller, the entire surface of the shell always ornamented, and the grooves usually deeper.

The specimen figured by d'Orbigny as *Lima Mantelli* is similar in form to some examples of *L. cretacea*, but d'Orbigny states that the furrows are shallow and without pits. A specimen, however, in the d'Orbigny Collection at Paris shows pits in the grooves.

Lima læviuscula, Sowerby (in Dixon) is probably a small example of this species, but its locality and horizon are not stated.

One of the specimens from the Pläner-kalk of Strehlen figured by Geinitz (1872) as *L. Hoperi* (fig. 11) agrees very closely with this species.

Distribution.—Zone of *Terebratulina* of Winchester. Zone of *Holaster planus* of Twyford and Cheveley. Zone of *Micraster cor-testudinarium* of Borstal and Cuxton. Zone of *M. cor-anguinum* of Micheldever, Witherington and Camp Hill (South Wiltshire). Zone of *Marsupites* of Highfield. *Uintacrinus* band of Devizes Road (Salisbury). Zone of *Actinocamax quadratus* of Winchester, East Harnham, West Harnham, and Milford (Salisbury). Zone of *Belemnitella mucronata* of Norwich. Chalk of Trimingham.

LIMA (PLAGIOSTOMA) MARROTIANA, *d'Orbigny*, 1847. Plate V, figs. 6*a*, *b*, 7*a*, *b*.

1847. LIMA MARROTIANA, *A. d'Orbigny*. Pal. Franç. Terr. Crét., vol. iii, p. 561, pl. ccccxxiv, figs. 1—4.
1850. — — *d'Orbigny*. Prodr. de Pal., vol. ii, p. 247.
1889. — (RADULA) MARROTIANA, *O. Griepenkerl*. Senon. von Königslutter (Palæont. Abhandl., vol. iv), p. 39.

Non 1850. — MAROTTIANA, *A. Alth*. Geogn.-pal. Beschreib. v. Lemberg (Haidinger's Naturwiss. Abhandl., vol. iii, pt. 2), p. 240, pl. xii, fig. 25. (*L. Althi*, Favre).

Description.—Shell of moderate convexity, oval, more or less trigonal. Antero-dorsal margin rather long, nearly straight; postero-dorsal margin much shorter; the remainder forming a regular curve. Umbones rather small, pointed. Apical angle about 105°. Anterior area large, deeply depressed, sharply limited, ornamented with 10 to 12 strong, rather narrow ribs, which bear, in places, small nodular projections. Ears rather large, with growth-ridges, without ribs; the posterior rather larger than the anterior ear.

Ornamentation consists of 30 to 32 broad ribs with a few smaller ribs near the posterior margin; the ribs are smooth, with flattened or somewhat rounded summits, and are separated by narrow rounded grooves. The grooves show, in places, transverse ridges and grooves which may extend to the sides of the ribs, giving them a notched appearance. Near the ventral margin, especially in old specimens, the ribs become more flattened and the grooves shallower.

Measurements:

	(1)	(2)
Length	59	27 mm.
Height	60	28 ,,

(1, 2) Upper Chalk (*B. mucronata* zone), Norwich. The measurements of the larger specimen are approximate only.

Affinities.—This is distinguished from other species found in the Chalk by its strong ribs. In *Lima Althi*, Favre, the ribs are more numerous and not so broad.

Lima Marrotiana differs from most of the species which are referred to *Plagiostoma* in having much stronger ribs, but in other respects it agrees closely with that sub-genus.

Remarks.—The only specimens I have seen are from Norwich, where it appears to be rare. The shell is usually more or less crushed, so that its proper outline is distorted.

Types.—D'Orbigny's specimens came from the Lower Senonian of Dordogne, Charente-Inférieure, Cambrai, and Aube.

Distribution.—Zone of *Belemnitella mucronata* of Norwich.

Sub-genus—ACESTA, *H. and A. Adams*, 1858.

('Genera of Recent Mollusca,' vol. ii, p. 558.)

LIMA (ACESTA) LONGA, *Römer*, 1841. Plate V, figs. 8 *a*, *b*, 9—11, 12 *a*, *b*.

1836.	LIMA ELONGATA, *F. A. Römer.*	Die Verstein. d. nord-deutsch. Oolith.-geb., p. 79, pl. xiii, fig. 11 (non *elongata*, Sowerby).
1841.	— LONGA, *Römer.*	Die Verstein. d. nord-deutsch. Kreidegeb., p. 57.
1847.	— — *A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 529, pl. cccxiv, figs. 13—16.
1850.	— — —	Prodr. de Pal., vol. ii, p. 81.
1865.	— — *H. Coquand.*	Mon. Aptien de l'Espagne, p. 149.
1868.	— — *P. de Loriol.*	Valangien d'Arzier. (Matér. Pal. Suisse, ser. 4), p. 41, pl. iii, fig. 11.
1869.	— — *F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 128, pl. clxi, figs. 6, 7.
1871.	— — *W. A. Ooster.*	Protozoe Helvetica, vol. ii, pp. 104, 123.
1877.	— — *G. Böhm.*	Zeitschr. d. deutsch. geol. Gesellsch., vol. xxix, p. 235.
1883.	— — *W. Keeping.*	Foss., etc., Neoc. Upware and Brickhill, p. 112, pl. v, fig. 6.
1884.	— n. sp., *O. Weerth.*	Die Fauna des Neocom. im Teutoburg. Walde (Palæont. Abhandl., vol. ii), p. 51.
? 1895.	— (PLAGIOSTOMA) cf. ROBINALDINA, *F. Vogel.*	Holländ. Kreide, p. 56.
1896.	— LONGA, *A. Wollemann.*	Zeitschr. der deutsch. geol. Gesellsch., vol. xlviii, p. 836.
1900.	— — —	Die Biv. u. Gastrop. d. deutsch. u. holländ. Neocoms (Abhandl. d. k. preussisch. geol. Land., N. F., pt. 31), p. 27.

Description.—Shell compressed, sub-triangular, rounded, considerably higher than long, of small obliquity. Posterior and ventral margins convex; anterior margin straight. Umbones pointed, close together. Apical angle small—about 70°. Posterior ear large, not separated from the rest of the valve by a depression, ornamented with radial ribs. Anterior ear smaller, much higher than long.

Anterior area lanceolate, depressed, limited by a sharp edge, ornamented with radial ribs.

Ornamentation consists of very numerous, small, somewhat flattened ribs, separated by much narrower grooves. The ribs are usually wavy, and are not all of equal size; posteriorly smaller ribs sometimes alternate with larger. The grooves are punctate and vary somewhat in width. A few distinct growth-lines are seen, below which the direction of the ribs may undergo some deflection.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	
Length . .	37	35	31	23	21	20	mm.
Height . .	62	58	56	37	35	32	„

(1, 2, 3, 5) Lower Greensand, Upware.
(4) Tealby Limestone, North Willingham.
(6) Speeton Clay, Speeton.

Affinities.—*Lima longa* has a smaller apical angle and is relatively shorter than *L. undata*, Deshayes[1]; it is also clearly distinguished by the absence of the prominent concentric scales, and by the occurrence of pits in the grooves.

Remarks.—In some cases, especially when the specimens are not perfectly preserved, the ribs (as remarked by Wollemann) become indistinct on the middle of the shell. This is the case in specimens from the Tealby Limestone, and in some from the Speeton Clay, in which the middle part of the shell is almost smooth. The outline of the shell and the relative size of the posterior ear are rather variable.

A specimen from West Dereham (Plate V, fig. 13) possesses finer ribs, but may perhaps be only a variety of this species.

Types.—From the Hilsthon of Elligser Brink. A specimen from the same locality (imperfect on the posterior side of the umbo) is figured by d'Orbigny and is preserved in the Museum of Palæontology at Paris. Two of the specimens from Upware figured by Keeping are in the Sedgwick Museum, Cambridge, and another is in the collection of Mr. J. F. Walker.

Distribution.—Lower Greensand of Upware, Potton, and Brickhill. Tealby Limestone (zone of *Belemnites brunsvicensis*) of North Willingham. Upper part of Speeton Series of Speeton.

LIMA (ACESTA) CLYPEIFORMIS, *d'Orbigny*, 1847. Text-figure 5.

1847. LIMA CLYPEIFORMIS, *A. d'Orbigny*. Pal. Franç. Terr. Crét., vol. iii, p. 543, pl. cccxvii, figs. 9, 10.
1850. — — *d'Orbigny*. Prodr. de Pal., vol. ii, p. 166.

[1] See d'Orbigny, p. 528, pl. cccxiv, figs. 9—12; Pictet and Campiche, p. 133, pl. clxii, fig. 1.

1869. Lima clypeiformis, *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse ser. 5), p. 168.

1871. Radula (Acesta) clypeiformis, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.

Description.—Shell very large, compressed, oval, rounded, only slightly oblique. Height equal to or slightly greater than length. Antero-dorsal margin more or less

Fig. 5.—*Lima (Acesta) clypeiformis,* d'Orbigny. Upper Greensand, Chard. Right valve. Taunton Museum. × ⅔.

straightened and relatively short. Ears rather small, the anterior larger than the posterior. Surface of shell smooth, except for growth-lamellæ at intervals.

Measurements :

Length	160 mm.
Height	168 „

Upper Greensand, Chard.

Affinities.—*Lima subclypeiformis*, Futterer,[1] is stated to be related to *L. clypeiformis*.

Remarks.—This is the largest species of *Lima* known in the Cretaceous of England. I have seen two specimens only, one of which is in the Museum of the Somersetshire Archæological and Natural History Society at Taunton, and the other in the Exeter Museum. The occurrence of this species in England was first recorded by Mr. Jukes-Browne.[2]

Type.—D'Orbigny's specimens came from the Cenomanian of Le Mans, etc.

Distribution.—Topmost bed of the Upper Greensand of Chard.

Sub-genus—MANTELLUM, *J. F. Bolten*, 1798.

('Mus. Bolten.,' 2, p. 160.)

LIMA (MANTELLUM) PARALLELA (*Sowerby*) 1812. Plate V, figs. 14, 15 *a—d*.

1812.	MODIOLA PARALLELA, *J. de C. Sowerby.*	Min. Conch., vol. i, p. 31, pl. ix (right-hand top figure).
1842.	LIMA ELEGANS, *A. Leymerie.*	Mém. Soc. géol. de France, vol. v, p. 27, pl. vi, fig. 6. (*Non* Dujardin, *non* Nilsson.)
1845.	— ELONGATA, *E. Forbes.*	Quart. Journ. Geol. Soc., vol. i, p. 248.
1846.	— ELEGANS, *A. Leymerie.*	Statist. géol. et min. de l'Aube, pl. vi, fig. 7.
1847.	— COTTALDINA, *A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 537, pl. ccccxvi, figs. 1—5.
1850.	— — *d'Orbigny.*	Prodr. de Pal., vol. ii, p. 119.
1854.	— PARALLELA, *J. Morris.*	Cat. Brit. Foss., ed. 2, p. 171.
1855.	— COTTALDINA, *G. Cotteau.*	Moll. Foss. de l'Yonne, p. 101.
1858.	— — *J. Vilanova-y-Piera.*	Mem. geog.-agric. de Castellon, pl. ii, fig. 15.
—	— PARALLELA, *F. J. Pictet and E. Renevier.*	Foss. Terr. Aptien (Matér. Pal. Suisse, ser. 1), p. 126, pl. xix, fig. 1.
1865.	— — *H. Coquand.*	Mon. Aptien de l'Espagne, p. 148.
1869.	— COTTALDINA, *F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 151, pl. clxvi, fig. 1.
1883.	— FARRINGDONENSIS, *W. Keeping.*	Foss., etc., Neoc. Upware and Brickhill, p. 112, pl. v, fig. 12.
1884.	— COTTALDINA, *O. Weerth.*	Die Fauna des Neocom. im Teutoburg. Walde (Palæont. Abhandl., vol. ii), p. 52.

[1] 'Kreidebild. d. Santa Croce in den Venetianer Alpen' (Palæont. Abhandl., vol. vi, 1892), p. 78, fig. 23.

[2] 'Proc. Somerset Archæol. and Nat. Hist. Soc.,' vol. xlix, 1903.

1895. Lima Cottaldina, *G. Maas.* Zeitschr. der deutsch. geol. Gesellsch., vo . xlvii, p. 267.
— — (Radula) Cottaldina, *F. Vogel.* Holländisch. Kreide., p. 56.
1900. — Cottaldina, *A. Wollemann.* Die Biv. u. Gastrop. d. deutsch. u. holländ. Neocoms (Abhandl. d. k. preussisch. geol. Land., N. F., pt. 31), p. 35, pl. ii, figs. 2, 3.

Non 1847. — parallela, *d'Orbigny.* (See p. 31).

Description.—Shell moderately convex, oblique, oval or rounded-oblong, higher than long. Antero-dorsal margin long, nearly straight, more or less parallel with the postero-ventral margin; postero-dorsal margin short, more or less nearly straight. Anterior margin regularly rounded. Umbones sharp, only slightly curved; apical angle about 90°. Ears of moderate size. Anterior area rather large, slightly convex ventrally, depressed near the umbo, usually smooth except for growth-lines.

Ornamentation consists of 18 to 20 principal ribs, and sometimes of a few smaller ribs near the posterior margin. The principal ribs are roof-like with sharp summits; they are strongest on the antero-dorsal part of the valve and become less elevated and rather more widely separated in passing posteriorly; the two or three anterior ribs (near the anterior area) are rather smaller and closer together. A small rib occurs at the bottom of the furrows between the main ribs; smaller linear ribs may occur on the sides of the principal ribs, especially on the posterior part of the shell. Fine concentric growth-lines are seen on the ribs and furrows.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Length .	26	26	25	23	23	22	19	14 mm.
Height .	21	22	20	19	18	17	16	11 ,,

(1, 4) *Perna*-bed, Atherfield.
(2, 5) Hythe Beds, Lympne.
(3) Lower Greensand, Upware.
(6, 7) Hythe Beds, Hythe.
(8) Ferruginous Sands, Shanklin.

Affinities.—This species is closely allied to *L. Royeriana*, d'Orbigny,[1] but in the latter the ribs do not decrease in size nor become more widely separated on the posterior part of the shell, and the small rib in the furrows is absent or indistinct.

L. parallela is distinguished from *L. gaultina* (p. 31) by being relatively shorter and less compressed, by the ribs on the posterior part of the shell being

[1] 'Pal. Franç. Terr. Crét.,' vol. iii (1847), p. 527, pl. ccccxiv, figs. 5—8; Pictet and Campiche, 'Terr. Crét. Ste. Croix' (1869), p. 142, pl. clxiv, figs. 4, 5.

more distinctly smaller than those on the anterior part, and by the presence of the small rib at the bottom of each groove. See also *L. farringdonensis* (below).

L. expansa, Forbes,[1] from the Hythe Beds of Hythe, is known to me only from the type specimen which is preserved in the Museum of the Geological Society (No. 2056). It is an internal cast in clay, somewhat crushed, and shows the ribbing only imperfectly. I think it is probably an example of *L. parallela*, but more specimens from the same horizon are needed before a confident opinion can be given. Similar remarks apply to *L. lingua*, Forbes,[2] which comes from the same horizon and locality, and is likewise preserved in the Museum of the Geological Society (No. 2058).

This and the following eight species are provisionally referred to the sub-genus *Mantellum*, with which they agree in the form of the shell and, in many cases, in the general character of the ornamentation. They differ, however, from the type of *Mantellum* in having the valves closed or almost closed, but there is, as Phillipi has pointed out, every transition from the species in which the valves gape widely to others in which they are closed.

Remarks.—This species shows a fair amount of variation in the proportions of length and height, and also in the obliquity of the shell.

The type-specimen of *L. parallela* is an internal cast, and consequently all writers have found it practically impossible to make out the characters of the species from Sowerby's figure. A comparison of the type with better preserved specimens leaves no doubt in my mind that Sowerby's species is really identical with the form described by d'Orbigny as *L. Cottaldina*. The latter author referred a species found in the Gault (*L. gaultina*, p. 31) to *L. parallela*, Sowerby.

Types.—The type is from the Hythe Beds of Maidstone and is preserved in the British Museum (No. 43,292). The specimen from Upware figured as *L. farringdonensis* by Keeping is in the Sedgwick Museum, Cambridge.

Distribution.—*Perna*-bed and Atherfield Clay of Atherfield. Ferruginous Sands of Shanklin. Hythe Beds of Hythe, Lympne, and Maidstone. Sandgate Beds of Sevenoaks. Folkestone Beds of Folkestone. Lower Greensand of Faringdon and Upware. Speeton Clay of Speeton.

LIMA (MANTELLUM) FARRINGDONENSIS, *Sharpe*, 1853.

1853.	LIMA FARRINGDONENSIS,	*D. Sharpe.*	Quart. Journ. Geol. Soc., vol. x, p. 198, pl. vi, fig. 2.
Non 1883.	—	—	*W. Keeping.*	Foss., etc., Neoc. Upware and Brickhill, p. 112, pl. v, fig. 12.

[1] 'Quart. Journ. Geol. Soc.,' vol. i (1845), p. 249, pl. iii, fig. 11.

[2] Ibid., p. 249, pl. iii, fig. 10.

Remarks.—The chief character in which *Lima farringdonensis* differs from *L. parallela* seems to be in the possession of well-marked ribs over the whole of the anterior area. It also differs from the majority of examples of *L. parallela* in that the ribs only decrease in size to a very small extent in passing from the anterior to the posterior part of the shell; and further, the shell is less inequilateral than is usual in *L. parallela*.

I am inclined to regard *Lima farringdonensis* as not more than a variety of *L. parallela*, but without better material it is impossible to express a confident opinion. Almost all the specimens seen are in the condition of internal casts in a brownish ferruginous sandstone.

Type.—The figure given by Sharpe is taken from a gutta-percha cast of an external mould. It was obtained from Seende and is preserved in the Museum of the Geological Society.

Distribution.—Lower Greensand of Seende and Faringdon.

Lima (Mantellum) gaultina, nom. nov. Plate V, figs. 16—20.

? 1827. Plagiostoma elongata, *J. de C. Sowerby.* Min. Conch., vol. vi, p. 113, pl. dlix, fig. 2 (upper figure only).

1847. Lima parallela, *A. d'Orbigny.* Pal. Franç. Terr. Crét., vol. iii, p. 539, pl. ccccxvi, figs. 11—14.

1850. — — *d'Orbigny.* Prodr. de Pal., vol. ii, p. 138.

1855. — — *G. Cotteau.* Moll. Foss. de l'Yonne, p. 101.

1854. — elongata, *J. Morris.* Cat. Brit. Foss., ed. 2, p. 171 (*partim*).

1875. — — *A. J. Jukes-Browne.* Quart. Journ. Geol. Soc., vol. xxxi, p. 296.

1897. — parallela, *R. B. Newton.* Proc. Dorset Nat. Hist. and Antiq. Field Club, vol. xvii, p. 88, pl. iii, fig. 11.

1900. — — *E. T. Newton* and *A. J. Jukes-Browne.* Cret. Rocks of Britain, vol. i, p. 449.

Non 1850. Plagiostoma parallelus, *J. de C. Sowerby* in *F. Dixon.* Geol. Sussex, p. 356 (p. 386, ed. 2), pl. xxviii, fig. 16 (=*L. elongata*, Sowerby).

Description.—Shell rather compressed, sub-quadrangular or nearly oblong, very oblique, much longer than high, rounded posteriorly; antero-dorsal margin long and nearly straight, almost parallel with the postero-ventral margin. Apical angle about 100°. Umbones pointed, close together. Ears of moderate size, the anterior larger than the posterior. Anterior area large, slightly concave dorsally, ornamented with fine radial ribs.

Ornamentation consists of 18 to 20 main ribs with a few smaller ribs posteriorly. The ribs are strong, with sharp summits, but become somewhat

weaker posteriorly. The sides of the ribs are ornamented with fine radial ribs, and at the summit there is sometimes a rib with pointed projections. Concentric growth-lines are present.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	
Length . .	39	34	29	29	28	17	mm.
Height[1] . .	28	23	20	18	20	12	„

(1, 4) Gault, Black Ven.
(2, 3, 5, 6) Gault, Folkestone.

Affinities.—*Lima Iteriana*, Pictet and Roux,[2] appears to differ from this species in having a small rib at the bottom of the groove, and in being relatively shorter. Pictet and Campiche state that the small rib is not always present. I have seen no trace of such a rib in even the best preserved examples of *L. gaultina*. See also *Lima elongata* (p. 36).

Remarks.—One of the specimens figured by Sowerby as *Plagiostoma elongata* (the upper figure 2 of Plate DLIX) is probably an example of this species, but since it is an internal cast only, it is difficult to be sure of its identity without seeing other specimens from the same horizon. The specimen in question, however, agrees in form and in the characters of the ribs with other internal casts which undoubtedly belong to this species. D'Orbigny referred this species to *Lima parallela* (Sowerby) and also included with it *L. elongata*, Sowerby (p. 34).

Types.—The specimen figured by Sowerby, mentioned above, is stated to come from the "Greensand of Folkestone." D'Orbigny's specimens of *Lima parallela*, d'Orbigny *non* Sowerby, came from the Gault of Gérodot and Dienville (Aube).

Distribution.—Gault of Folkestone (zones ii, vii, ix). Gault of Ventnor and Black Ven. Cambridge Greensand (derived). Upper Greensand (zone of *Schlœnbachia rostrata*) of Devizes. Internal casts from the Speeton Clay (zone of *Belemnites jaculum*, C 11) seem to be indistinguishable from this species.

LIMA (MANTELLUM) INTERLINEATA, *Jukes-Browne*, 1877. Plate VI, figs. 1 *a*, *b*.

1877. LIMA INTERLINEATA, *A. J. Jukes-Browne*. Quart. Journ. Geol. Soc., vol. xxxiii, p. 502, pl. xxi, fig. 10.

Description.—Shell moderately convex, rounded-oblong. Umbones and ears not seen.

[1] Measured perpendicular to the hinge-line.

[2] 'Moll. Foss. Grès verts de Genève' (1852), p. 484, pl. xl, fig. 5; F. J. Pictet and G. Campiche, 'Foss. Terr. Crét. Ste. Croix' (Matér. Pal. Suisse, ser. 5, 1869), p. 156, pl. clxvi, figs. 4, 5.

Ornamentation consists of 10 to 12 strong ribs with broad interspaces. On the posterior part of the shell the ribs are more widely separated and the interspaces flatter than on the anterior part. In the interspaces there are small radial ribs separated by broad spaces.

Remarks.—The only specimens seen are a few imperfect internal moulds with very small portions of the shell preserved. *L. interlineata* appears to be allied to *L. gaultina* (see above) but is distinguished by possessing fewer ribs with broader and flatter interspaces. The smaller radial ribs are perhaps also better developed than in *L. gaultina*.

Type.—In the Sedgwick Museum, Cambridge.

Distribution.—Cambridge Greensand (derived from the Gault).

LIMA (MANTELLUM) INTERMEDIA, *d'Orbigny*, 1847. Plate VI, figs. 2*a*, *b*, 3, 4*a*—*c*.

1847.	LIMA INTERMEDIA,	*A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 550, pl. cccxxi, figs. 1—5.
1850.	—	— *d'Orbigny.*	Prodr. de Pal., vol. ii, p. 167.
1869.	—	— *F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 168.
? 1877.	—	— *A. Fritsch.*	Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 134, fig. 123.

Description.—Shell moderately compressed, oblique, oval or rounded-oblong, higher than long. Antero-dorsal border rather long and roughly parallel to the slightly curving postero-ventral border; both curve gradually and regularly to join the posterior border. Postero-dorsal shorter than the antero-dorsal border. Umbones inconspicuous, close together. Apical angle about 100°. Ears small, of nearly equal size, the posterior with three or four small radial ribs and with growth-ridges. Anterior area moderately large, slightly convex except near the umbones, smooth or with a few small ribs at the sides.

Ornamentation consists of 20 to 23 ribs. Those on the antero-ventral region are strong and roof-like, and, in old specimens, bear a smaller rib on each side; posterior to this region the ribs become much smaller and less elevated, some being almost linear and with broad and nearly flat interspaces. At the bottom of the furrows and in the middle of the flat interspaces there is a linear rib. In well-preserved specimens very fine radial ribs and concentric lines are seen.

Measurements :

	(1)	(2)	(3)
Length	35	30	30 mm.
Height	31	28	26 „
Thickness	18	17	16 „

(1, 2) Rye Hill Sands, Warminster.
(3) Upper Greensand, Longbridge, Devizes.

Affinities.—This species is closely allied to *Lima parallela*, but is distinguished by being less convex (especially in the region of the umbones), by being rather shorter and higher, and by the ribs decreasing in size rather more rapidly when traced from the antero-ventral region to the posterior region. The fine radial ornamentation is also perhaps rather better marked than in *L. parallela*.

L. intermedia differs from *L. elongata* (see below) in being less convex, relatively shorter, in the ribs being less elevated and decreasing in size posteriorly, and in the absence or indistinct character of the ribs on the anterior area.

It is also relatively shorter and higher than *Lima gaultina*, and the ribs on the posterior half are much smaller and have broader and flatter interspaces. The intermediate rib is distinct in *L. intermedia*, but is absent or indistinct in *L. gaultina*.

Type.—From the Cenomanian of Le Mans.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Longbridge, near Devizes. Rye Hill Sands of Warminster.

LIMA (MANTELLUM) ELONGATA (*Sowerby*), 1827. Plate VI, figs. 5, 6*a*—*c*, 7*a*, *b*.

1822. PLAGIOSTOMA, *G. Mantell.* Foss. S. Downs, p. 129, pl. xix, fig. 1.
1827. — ELONGATA, *J. de C. Sowerby.* Min. Conch., vol. vi, p. 113, pl. dlix, fig. 2 (lower figure).
? 1847. LIMA ASTIERIANA, *A. d'Orbigny.* Pal. Franç. Terr. Crét., vol. iii, p. 549, pl. ccccxx, figs. 4—7.
1850. PLAGIOSTOMA PARALLELUS, *J. de C. Sowerby* in *F. Dixon.* Geol. Sussex, p. 356 (p. 386, ed. 2), pl. xxviii, fig. 16.
1854. LIMA ELONGATA, *J. Morris.* Cat. Brit. Foss., ed. 2, p. 171 (*partim*).
1869. — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 168.
1870. — — *F. Römer.* Geol. von Oberschles., p. 343, pl. xxix, fig. 1.
? 1876. — — *H. Deicke.* Tourtia von Mülheim a. d. Ruhr, p. 27.
? 1877. — — *G. Böhm.* Zeitschr. d. deutsch. geol. Gesellsch., vol. xxix p. 234.
1897. — — *R. Leonhard.* Kreideformat. in Oberschles. (Palæontographica, vol. xliv), p. 47.
1904. — — *E. T. Newton* and *A. J. Jukes-Browne.* Cret. Rocks of Britain, vol. iii, p. 451.

Non	1836.	Lima elongata,		*A. Goldfuss.*	Petref. Germ., vol. ii, p. 87, pl. cii, fig. 13 (*L. Münsteriana*, d'Orbigny).
—	—	—	—	*F. A. Römer.*	Verstein. nord-deutsch. Oolith.-geb., p. 79, pl. xiii, fig. 11 (*L. longa*, Römer, 1841).
? —	1841.	—	—	*F. A. Römer.*	Die Verstein. d. nord-deutsch. Kreidegeb., p. 56.
—	1845.	—	—	*E. Forbes.*	Quart. Journ. Geol. Soc., vol. i, p. 248 (*L. parallela*, Sowerby).
? —	1846.	—	—	*A. E. Reuss.*	Die Verstein. der böhm. Kreideformat., pt. 2, p. 33, pl. xxxviii, fig. 6, non 9 (= *L. Reussi*, d'Orb.).
—	1863.	—	—	*A. v. Strombeck.*	Zeitschr. d. deutsch. geol. Gesellsch., vol. xv, p. 104 (*L. Schmeisseri*, Wollemann).
? —	1872.	—	—	*H. B. Geinitz.*	Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 2), p. 40, pl. ix, figs. 9, 10.
? —	1877.	—	—	*A. Fritsch.*	Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 132, fig. 116.

Description.—Shell of moderate convexity, subquadrangular or nearly oblong, rounded anteriorly, much longer than high. Antero-dorsal margin long, nearly straight, and nearly parallel with the postero-ventral margin; postero-dorsal margin short, nearly straight. Apical angle about 100°. Umbones sharp, close together. Ears of moderate size. Anterior area large, the dorsal part slightly concave, ornamented with from five to seven fairly strong ribs which are crossed by fine growth-ridges.

Ornamentation consists of 19 or 20 very strong ribs, with sharp, and sometimes (especially on the dorsal part of the shell) slightly serrate summits. The ribs have usually at their summits a distinct ridge with a shallow furrow on each side, which sometimes gives rise to the appearance of a ridge on each side of the rib. The grooves between the main ribs are deep, rounded, distinctly limited, and of about the same width as the ribs. On the dorsal portions of the shell fine radial ribs occur on both ribs and grooves; on the ventral portions they are not seen. Fine concentric growth-lines cross both ribs and grooves, and some few (at intervals) are more distinct.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	
Length .	34	27	26	25	24	24	mm.
Height .	24	18	20	20	18	17	,,

(1. 3, 5, 6) Chalk Marl, Folkestone.
(2) *H. subglobosus* zone, Stoke Ferry.
(4) Chalk Marl, Ventnor.

Affinities.—This species agrees in form with *Lima gaultina* (p. 31), but is distinguished (1) by the stronger ribs on the anterior area, (2) by the grooves being relatively broader and more distinctly limited, (3) by the ribs being more elevated, (4) by the fine radial ribs being usually indistinct except on the dorsal portions of the shell.

The form from the Pläner-kalk (Turonian) of Saxony figured as *Lima elongata* by Geinitz seems to differ from this species in having fewer and more rounded ribs, and in the ribs being more widely separated on the posterior part of the shell than elsewhere. Similar remarks apply to the specimen figured by Fritsch. Without the opportunity of comparing specimens I am unable to give a definite opinion as to the Turonian form being distinct from *L. elongata*.

Lima Astieriana, d'Orbigny, is perhaps identical with *L. elongata*, but the summits of the ribs appear to be somewhat more rounded.

Lima Reussi, d'Orbigny (*L. elongata* of Reuss) seems to differ from *L. elongata* in having a smaller apical angle.

Remarks.—Under the name *Plagiostoma elongata* Sowerby figured two species. It seems advisable to retain the name *elongata* for the one shown in the lower of his two figures, since that form had been previously figured and described (but without a specific name) by Mantell, and Sowerby refers to Mantell's figure as an example of *Plagiostoma elongata*.

Types.—I have not seen the specimen figured by Mantell. Sowerby's type, from the Chalk Marl of Hamsey, and also the specimen figured in Dixon's work are in the British Museum.

Distribution.—The range is from the Chloritic Marl to the zone of *Holaster subglobosus*. Chloritic Marl of Eastbourne and the Isle of Wight. Chalk Marl of Ventnor, Folkestone, and Prince's Risborough. Totternhoe Stone of Arlesey. Zone of *Holaster subglobosus* of Blue Bell Hill (Burham), Stoke Ferry, and Hunstanton.

LIMA (MANTELLUM) ELONGATA, var. ECHINATA, *Etheridge*, 1881. Plate VI, figs. 8, 9 *a*—*c*.

1881. LIMA ECHINATA, *R. Etheridge*. In *Penning and Jukes-Browne*, Geol. Cambridge, p. 144, pl. ii, fig. 2.

Remarks.—The examples described by Etheridge as *Lima echinata* agree perfectly in form, in size, and in the number and character of the ribs with *L. elongata*, but on the ridge at the summit of each rib there is a row of short spines which are frequently rounded and stumpy, and on each side of the rib (outside the

shallow groove mentioned in the description of *L. elongata*) there is another row of similar, but slightly smaller spines. In the furrows between the main ribs there are transverse ridges.

On account of the close resemblance in the form and ribbing of *L. echinata* to *L. elongata*, and also from the fact that in some specimens of the former the ornamentation of the ribs is absent from a part of the shell and the ribs are then indistinguishable from those of *L. elongata*, I am led to consider *L. echinata* as not more than a variety of *L. elongata*. Further, in some specimens of *L. elongata* the summits of the ribs are serrate.

L. elongata var. *echinata* presents some resemblance to *L. Schmeisseri*, Wollemann,[1] from the *Rhotomagensis*-Pläner of Lüneburg.

Types.—In the Sedgwick Museum, from Burwell.

Distribution.—Totternhoe Stone (*Holaster subglobosus* zone) of Burwell and Cherry Hinton. Also recorded in the 'Geological Survey Memoirs' from the zone of *Schlœnbachia varians*.

LIMA (MANTELLUM) CANTABRIGIENSIS, nom. nov. Plate VI, figs. 10*a*, *b*, 11, 12.

1881. LIMA ORNATA. *R. Etheridge.* In *Penning and Jukes-Browne*, Geol. Cambridge, p. 144, pl. iii, fig. 2 (non *ornata*, d'Orbigny, 1847; non *ornata*, Buvignier, 1852).

Description.—Shell moderately convex, oval or rounded-oblong. Anterior margin rounded. Umbones and ears not seen.

Ornamentation consists of 16 or 17 main ribs with a few small ribs at the posterior end. The anterior ribs are strong, roof-like, with ridged summits; posteriorly the ribs become less prominent and the interspaces less depressed. Both ribs and grooves are ornamented with fine, well-developed ribs, which are closer together on the ribs than in the grooves; usually three or four occur on each side of a main rib and three in each groove. Numerous concentric ridges occur and give rise to spiny projections where they cross the fine radial ribs.

Affinities.—In form this appears to be similar to *L. parallela* (p. 28), but has fewer ribs and is much more highly ornamented. The small rib at the bottom of the groove is not distinguishable from the other ribs.

It is more convex, has fewer ribs, and has the fine ornamentation better developed than in *L. intermedia*.

Remarks.—This species is known by three specimens only. All are imperfect near the umbo, but the fine ornamentation is well-preserved.

[1] 'Abhandl. d. k. preussisch. geol. Landesanst., N. F.,' Heft 37 (1902), p. 55, pl. vii, fig. 9.

On account of the name *ornata* having been previously used by d'Orbigny and by Buvignier for other species it is necessary to substitute some other name.

Types.—From the Cambridge Greensand (indigenous), preserved in the Sedgwick Museum, Cambridge.

Distribution.—Cambridge Greensand (indigenous). Lower Chalk of Burwell.

LIMA (MANTELLUM) BRITANNICA, sp. nov. Plate VI, figs. 13 *a*—*d*.

1857. LIMA ELEGANS, *J. W. Salter*. Quart. Journ. Geol. Soc., vol. xiii, p. 85, pl. ii, fig. 3 (non *elegans*, Nilsson).

Description.—Shell moderately convex, sub-quadrate or nearly oblong, very oblique. Antero-dorsal and postero-ventral margins more or less parallel; posterior margin rounded. Ears of moderate size, with a few ribs on the inner portions, and with distinct growth-lines; the anterior larger than the posterior ear. Anterior area not distinctly limited, covered with ribs similar to those on the rest of the valve but of nearly uniform size.

Ornamentation consists of eighteen main ribs, which are strong on the anterior part of the shell, but become smaller in passing to the posterior end. At the summit of each main rib is a narrow, elevated, secondary rib, and on each side of a main rib are two or three similar but rather small ribs. The secondary ribs are separated by broad and rounded furrows. The summits of the secondary ribs are usually sharp and even, but occasionally slightly serrate.

Measurements:

Length	19 mm.
Height	24 „

Affinities.—This form, of which I have seen one example only, agrees with the specimen preserved in flint from Moreseat (Aberdeenshire) which was described and figured by Salter as *Lima elegans* (Nilsson). That specimen is now in the Museum of Practical Geology. Nilsson's[1] figure is scarcely sufficient to enable one to determine the species, but from the recent illustrations given by Hennig[2] it is seen that the British specimens differ from *Lima elegans* in being more distinctly oblong and especially in having more numerous secondary ribs.

[1] 'Petrif. Suecana' (1827), p. 26, pl. ix, fig. 7; Hisinger, 'Lethæa Suecica' (1837), p. 55, pl. xv, fig. 10.

[2] Revis. Lamellibr. i Nilsson's 'Petrif. Suecana' (1897), p. 33, pl. ii, figs. 9, 10, 11, 24; *Lima elegans*, Dujardin ('Mém. Soc. géol. de France,' vol. ii, 1837, p. 226, pl. xvi, fig. 1), is apparently distinct from Nilsson's species.

Type.—In the collection of Mr. R. M. Brydone.

Distribution.—Lower part of the zone of *Micraster cor-anguinum* of Seaford.

LIMA (MANTELLUM) REICHENBACHI, *Geinitz*, 1839. Plate VI, figs. 14 *a*, *b*, 15.

1839.	LIMA	REICHENBACHI, *H. B. Geinitz.*	Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. 1, p. 24, pl. viii, fig. 4.
1841.	—	REICHENBACHII, *F. A. Römer.*	Die Verstein. d. nord-deutsch. Kreidegeb., p. 57.
1843.	—	REICHENBACHI, *H. B. Geinitz.*	Die Verstein. von Kieslingswalda, p. 23, pl. v, fig. 9.
1846.	—	— *A. E. Reuss.*	Die Verstein. der böhm. Kreideformat., pt. 2, p. 34.
1847.	—	REICHENBACHII, *A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 544, pl. ccccxviii, figs. 1—4.
1850.	—	REICHENBACHI, *H. B. Geinitz.*	Das Quadersandst. oder Kreidegeb. in Deutschland, p. 190.
—	—	REICHENBACHII, *A. d'Orbigny.*	Prodr. de Pal., vol. ii, p. 166.
1855.	—	— *G. Cotteau.*	Moll. Foss. de l'Yonne, p. 101.
1867.	—	— *E. Guéranger.*	Album Paléont. de la Sarthe, p. 19, pl. xxiv, fig. 5.
1869.	—	REICHENBACHII, *F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 168.
1872.	—	— *H. B. Geinitz.*	Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 1), p. 203, pl. xliii, figs. 1, 2.
1876.	—	REICHENBACHI, *H. Deicke.*	Tourtia v. Mülheim a. d. Ruhr, p. 27.
1882.	—	REICHENBACHII, *P. de Loriol.*	Gault de Cosne, p. 101, pl. xiii, fig. 5.

Description.—Shell convex, oblong, oblique, rounded ventrally; antero-dorsal margin long, nearly straight and almost parallel with the opposite margin. Height considerably greater than length. Anterior area large, smooth, not depressed. Ears rather small, the anterior somewhat larger than the posterior.

Shell ornamented with from seven to ten very strong ribs, which have rounded summits and are separated by rounded grooves of about the same width as the ribs. Small and narrow radial ribs are present on both ribs and grooves.

Measurements :

	(1)	(2)	(3)
Length	29	25	21 mm.
Height	35	34	27 ,,
Thickness	19	16	— ,,

(1—3) Cenomanian, Wilmington.

Remarks.—This species is easily distinguished by the very strong radial ribs. The English specimens, which at present are known from three localities only, are not well-preserved, so that the details of the ornamentation cannot be seen clearly.

The occurrence of *L. Reichenbachi* in England (from Wilmington) was first noted by Mr. Jukes-Browne in 1898. The only specimens which I have seen are now in the Museum of Practical Geology and the Sedgwick Museum.

Types.—From the Lower Pläner (Cenomanian) of Plauen near Dresden.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Warminster. Chloritic Marl of Chard. Cenomanian Sandstone of Wilmington.

Lima (Mantellum), sp. Plate VI, fig. 16 *a*, *b*.

Remarks.—A small specimen in the Museum of Practical Geology (No. 7896) is similar in form and in the general character of its ornamentation to *L. cantabrigiensis* (see p. 37), but the main ribs are not so strongly developed, the interspaces are flatter, and the intermediate ribs are more prominent. It differs from *L. intermedia* in its more distinctly oblong form and in the occurrence of well-developed intermediate ribs.

This specimen resembles closely the lowest of the three figures referred to *Lima elegans* by Guéranger.[1]

Distribution.—Chloritic Marl of Chardstock.

Sub-genus—Ctenoides, *H. and A. Adams*, 1858 (ex *Klein*, 1753).

('Genera of Recent Mollusca,' vol. ii, p. 557).

Lima (Ctenoides) rapa, *d'Orbigny*, 1847. Plate VI, figs. 17*a*—*c*. Plate VII, fig. 1. Text-fig. 6.

1847.	Lima rapa,	*A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 546, pl. cccxix, figs. 1—4.
1850.	—	— *A. d'Orbigny.*	Prodr. de Pal., vol. ii, p. 166.
—	—	— *H. B. Geinitz.*	Das Quadersandst. oder Kreidegeb. in Deutschland, p. 188.
1855.	—	— *G. Cotteau.*	Moll. Foss. de l'Yonne, p. 101.
1867.	—	— *E. Guéranger.*	Album Paléont. de la Sarthe, p. 19, pl. xxiv, figs. 16, 17.

[1] 'Album Paléont. de la Sarthe' (1867), p. 18, pl. xxiv, fig. 1.

1869. Lima rapa, *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 168.

1871. Radula (Ctenoides) rapa, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.

1872. Lima rapa, *H. B. Geinitz.* Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 1), p. 206, pl. xliii, fig. 4.

Description.—Shell moderately and regularly convex, with ovate outline, nearly equilateral, considerably higher than long, margins evenly rounded. Umbones small, pointed, close together. Apical angle about 85°. Ears rather large, much

Fig. 6.—*Lima (Ctenoides) rapa*, d'Orbigny. Upper Greensand, Haldon. British Museum, No. L. 15616. Interior of right valve. Natural size.

higher than long, with fine radial ribs; the anterior ear larger than the posterior, the latter with its outer angle obtuse.

Ornamentation consists of numerous fine radial ribs which diverge slightly from a median or nearly median line or sometimes in places from two lines. These ribs are slightly raised and rounded, and are separated by very narrow grooves; near the anterior and posterior margins the ribs become much narrower and sharper, and may bear small pointed projections. The ribs are slightly wavy and their course is often more or less sharply deflected where they pass the growth-lamellæ. Numerous fine linear concentric ridges occur, and also some growth-lamellæ.

Measurements :

	(1)	(2)	(3)
Length	66	43	30 mm.
Height	90	59	41 „

(1–3) Upper Greensand, Haldon.

Affinities.—*L. rapa* is closely related to *L. divaricata* (p. 44) but the valves are less flattened and the anterior part slopes gradually to the margin; the outline is more regularly ovate, and the anterior and posterior ribs are much narrower than the others. *L. rapa* is usually considerably larger than *L. divaricata.*

Types.—From the Cenomanian of Coudrecieux and Le Mans.

Remarks.—The presence of this species in English deposits appears to have been recognised first by the late Mr. C. J. A. Meÿer; it was recorded by Mr. Jukes-Browne in 1896.

Distribution.—Upper Greensand of Haldon. Cenomanian (Meÿer's Bed 10) of Dunscombe.

LIMA (CTENOIDES) TECTA, *Goldfuss*, 1836. Plate VII, figs. 2, 3.

1836. LIMA TECTA, *A. Goldfuss.* Petref. Germ., vol. ii, p. 91, pl. civ, fig. 7.
1837. — FRONDOSA, *F. Dujardin.* Mém. Soc. géol. de France, vol. ii, pp. 216, 227, pl. xvi, fig. 10.
1839. — LAMELLOSA, *H. B. Geinitz.* Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. 1, p. 23.
1841. — TECTA, *F. A. Römer.* Die Verstein. d. nord-deutsch. Kreidegeb., p. 58.
1847. — — *A. d'Orbigny.* Pal. Franç. Terr. Crét., vol. iii, p. 547, pl. ccccxix, figs. 5—8.
1850. — — *H. B. Geinitz.* Das Quadersandst. oder Kreidegeb. in Deutschland, p. 188.
— — — *A. d'Orbigny.* Prodr. de Pal., vol. ii, pp. 166, 247.
— — — ?, *A. Alth.* Geogn.-pal. Beschreib. Umgeb. v. Lemberg (Haidinger's Naturwiss. Abhandl., vol. iii, pt. 2), p. 243.
? 1852. — — ?, *R. Kner.* Denkschr. d. k. Akad. Wissensch. Math.-nat. Cl., vol. iii, p. 318, pl. xvii, fig. 7.
1867. — — *E. Guéranger.* Album Paléont. de la Sarthe, p. 19, pl. xxiv, fig. 11.
1869. — — *E. Favre.* Moll. Foss. de la Craie de Lemberg, p. 135.
1869–70. — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), pp. 168, 170, 173.
1871. RADULA (CTENOIDES) TECTA, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 420, pl. xxx, fig. 12.

1872. Lima tecta, *H. B. Geinitz.* Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 1), p. 206, pl. xliii, fig. 3.
1877. — — *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: II, Weissenberg. u. Malnitz. Schicht., p. 130, fig. 113.
1894. — — *B. Lundgren.* Mollusk-faunan i *Mammillatus* och *Mucronata* zonerna (K. Svenska Vet.-Akad. Handl., vol. xxvi, No. 6), p. 43.
1895. — — *F. Vogel.* Holländisch. Kreide, p. 18.
— — cf. tecta, *E. Tiessen.* Zeitschr. d. deutsch. geol. Gesellsch., vol. xlvii, p. 474.
1898. — tecta, *G. Müller.* Mollusk. Untersen. v. Braunschweig u. Ilsede, p. 27.
1902. — — *M. v. Pálfy.* Mittheil. a. d. Jahrb. d. k. ungarisch. geol. Anstalt, vol. xiii, p. 275, pl. xx, fig. 5.

Description.—Shell convex, much flattened, sub-ovate, slightly oblique, considerably higher than long; antero-dorsal part sloping steeply to the antero-dorsal margin which is rather long and straightened. Umbones small, only slightly incurved. Ears rather large, relatively high, the anterior larger than the posterior.

Ornamentation consists of numerous small radial ribs, which are rounded, and smooth or nearly smooth. At fairly regular intervals the course of the ribs is interrupted by strong growth-lamellæ, ventrally to which the direction of the ribs is sometimes deflected. Growth-lamellæ, and sometimes ribs, are present on the ears.

Measurements:

Length	27 mm.
Height	39 „

From the Cenomanian (Bed 11) of Dunscombe.

Affinities.—This species is related to *L. divaricata* (see p. 44), but is distinguished by the growth-lamellæ, by the ribs not diverging from a median line, and by the absence of the fine concentric ridges. *Lima essertensis*, de Loriol,[1] from the Urgonian, is a similar form but is distinguished by the growth-lamellæ being more closely placed.

Remarks.—This species has a considerable stratigraphical range, extending from Lower Cenomanian to Senonian. It has been recognised in France, Holland, Scandinavia, Saxony, Bohemia, Hungary, etc. In England it has been found in the Cenomanian of Devon only, having been discovered and identified by the late Mr. C. J. A. Meÿer, and first recorded by Mr. Jukes-Browne. The examples from the Arrialoor Group, described by Stoliczka, seem quite indistinguishable from the European forms.

[1] 'Foss. Corall. Valang. et Urgonien de Mt. Salève' (1866), p. 83, pl. d, fig. 12; also in A. Favre, 'Recherch. géol. Savoie,' vol. i (1867), p. 388, pl. c, fig. 23; Pictet and Campiche, 'Terr. Crét. Ste. Croix' (1869), p. 139, pl. clxiii, fig. 7.

Types.—From the Senonian of Maestricht. D'Orbigny's specimens came from the Cenomanian of Le Mans and from the Senonian of Tours and Loir-et-Cher.

Distribution.—Cenomanian (Bed 11) of Dunscombe.

LIMA (CTENOIDES) DIVARICATA, *Dujardin*, 1837. Plate VII, figs. 4*a*—*d*, 5, 6*a*, *b*.

1837. LIMA DIVARICATA, *F. Dujardin.* Mém. Soc. géol. de France, vol. ii, p. 227, pl. xvi, fig. 7.
1840. — ARCUATA, *H. B. Geinitz.* Char. d. Schicht. u. Petref. des sächs. Kreidegeb., pt. 2, p. 57, pl. ix, fig. 7.
1841. — DIVARICATA, *F. A. Römer.* Die Verstein. d. nord-deutsch. Kreidegeb., p. 58.
1850. — — *A. d'Orbigny.* Prodr. de Pal., vol. ii, p. 248.
— — GRANOSA, *J. de C. Sowerby* in *F. Dixon.* Geol. Sussex, p. 347 (p. 382, ed. 2), pl. xxviii, figs. 24, 25.
1854. — — *J. Morris.* Cat. Brit. Foss., ed. 2, p. 171.
1859. MYTILUS? SPECTABILIS, *J. Müller.* Petref. der Aachen. Kreidef., supplement., p. 10, pl. vii, fig. 10.
1870. LIMA GRANOSA, *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix. (Matér. Pal. Suisse, ser. 5), p. 169.
— — DIVARICATA, *Pictet and Campiche.* Ibid., pp. 171, 173.
1871. RADULA (CTENOIDES) GRANOSA, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 415.
— — — DIVARICATA, *Stoliczka.* Ibid., p. 415.
1872. LIMA DIVARICATA, *H. B. Geinitz.* Das Elbthalgeb. in Sachsen (Palæontographica, vol. xx, pt. 1), p. 205, pl. xlii, fig. 18.
1889. — — *A. Fritsch.* Stud. im Gebiete der böhm. Kreideformat.: IV, Teplitz. Schicht., p. 83, fig. 77.
— — — *E. Holzapfel.* Die Mollusk. Aachen Kreide (Palæontographica, vol. xxxv), p. 241, pl. xxvii, fig. 7.
1897. — GRANOSA, *H. Woods.* Quart. Journ. Geol. Soc., vol. liii, p. 383.
1902. — DIVARICATA, *M. v. Pálfy.* Mittheil. Jahrb. d. k. ungarisch. geol. Anstalt, vol. xiii, p. 274, pl. xx, fig. 4.

Description.—Shell convex, flattened, the anterior marginal part sloping steeply, the posterior part more gradually; outline rather variable, more or less ovate or approaching to oblong, considerably higher than long, only slightly unsymmetrical. Umbones rather small, not much incurved. Ears relatively short and high, not sharply limited; the anterior larger than the posterior.

Ornamentation consists of numerous small radial ribs which diverge from a median or nearly median line or sometimes in part from two lines forming an

inverted **W**. The ribs are slightly raised and often somewhat wavy or irregular, especially near the growth-ridges. The ribs and grooves are crossed by numerous concentric linear ridges. The ribs are sometimes nodular, the nodules having a concentric arrangement. At intervals, usually rather distant and fairly regular, distinct growth-lamellæ are seen.

Measurements :

	(1)	(2)	(3)
Length	37	20	22 mm.
Height	51	37	32 „

(1) Chalk, Newtimber.
(2) *B. mucronata* zone, Norwich.
(3) *H. planus* zone, Dover.

Affinities.—See *L.* (*Ctenoides*) *rapa* (p. 42) and *L.* (*Ctenoides*) *tecta* (p. 43). *L. divaricata* also presents some resemblance to *Lima Holzapfeli*, Hennig,[1] found in the Danian of Faxe.

Remarks.—This species has hitherto been known in England as *Lima granosa*, Sowerby. After making a careful comparison I feel no hesitation in regarding it as identical with the widely-distributed *L. divaricata*, Dujardin. This form is comparatively rare in England, and the part of the shell near the umbo is usually wanting or imperfectly preserved.

Type.—From the Chalk (? Lower Senonian) of Touraine. Sowerby does not mention the locality or the horizon from which he obtained *Lima granosa*, and I have not succeeded in finding the type.

Distribution.—Zone of *Terebratulina* of Hitchin. Zone of *Holaster planus* of Winchester, Dover, and Cheveley, Blue Bell Hill, Burham (? *H. planus* zone). Chalk Rock of Cuckhamsley. Zone of *Micraster cor-anguinum* of Micheldever. Zone of *Actinocamax quadratus* of Salisbury. Zone of *Belemnitella mucronata* of Salisbury and Norwich.

Sub-genus—Limatula, *S. V. Wood*, 1839.

('Mag. Nat. Hist.,' new series, vol. iii, p. 233.)

Lima (Limatula) Tombeckiana, *d'Orbigny*, 1847. Plate VII, figs. 7*a*, *b*, 8*a*—*c*, 9*a*, *b*.

1847. Lima Tombeckiana, *A. d'Orbigny*. Pal. Franç. Terr. Crét., vol. iii, p. 534, pl. cccxv, figs. 13—17.
1850. — — *d'Orbigny*. Prodr. de Pal., vol. ii, p. 82.

[1] 'Bih. K. Svenska Vet. Akad. Handl.,' vol. xxiv, No. 7 (1899), p. 10, pl. i, figs. 1, 2; Ravn, 'Mollusk. Danmarks Kridtafl I. Lamellibr.' (1902), p. 100, pl. ii, fig. 15.

? 1854. Lima semisulcata, *J. Morris.* Cat. Brit. Foss., ed. 2, p. 172 (*partim*).
1855. — Tombeckiana, *G. Cotteau.* Moll. Foss. de l'Yonne, p. 100.
1861. — — *P. de Loriol.* Anim. Invert. Foss. Mt. Salève, p. 95, pl. xi, fig. 11.
1869. — — *P. de Loriol and V. Gilliéron.* Urgon. infér. de Landeron, p. 19, pl. i, fig. 17.
— — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 148.
1871. Radula (Limatula) Tombeckiana, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.
— Lima Tombeckiana, *W. A. Ooster.* Protozoe Helvetica, vol. ii, pp. 104, 123, 140.
1883. — — *W. Keeping.* Foss., etc., Neoc. Upware and Brickhill, p. 111.

Description.—Shell oval, inflated, higher than long, produced a little more anteriorly than posteriorly. Umbones rather small, close together. Ears equal. Margins of valves rounded, the posterior with a greater curvature than the anterior.

Ornamentation consists of from 13 to 16 strong, rounded or slightly keeled ribs separated by narrow grooves. The ribs are confined to the median part of the shell, and the anterior and posterior parts are without ribs. The ribbed portion is not quite symmetrically placed, the anterior smooth portion being rather larger than the posterior smooth portion. Very fine concentric ridges are present on the shell, and may form scale-like projections where they cross the ribs.

Measurements:

	(1)	(2)		(4)	(5)	(6)	
Length	9	9	8	8	7	11	mm.
Height	12	11	12·5	13	10	15·5	,,

(1—5) Hythe Beds, Court-at-Street.
(6) Lower Greensand, Brickhill.

Affinities.—Some specimens of *L. Tombeckiana* approach very closely *L. Fittoni* from Blackdown and Haldon (see p. 48), and it is quite possible that the latter is only a local variety of the former since some examples found in the Upper Greensand of Charmouth and Potterne (Plate VII, fig. 10) seem indistinguishable from *L. Tombeckiana.* As a rule *L. Tombeckiana* differs from *L. Fittoni* in having the ribbed part of the shell more nearly symmetrical in position, in the shell being rather longer and rather more convex with the umbonal part more pointed, and in the ribs being more rounded.

L. Tombeckiana differs from *L. semisulcata,* Nilsson, in being smaller, relatively longer, less symmetrical, and with the umbonal part more pointed. In this connection, however, it should be noted that Hennig[1] considers that specimens which

[1] Revis. Lamellibr. i Nilsson's 'Petrific. Suecana' (1897), p. 29.

he has seen from the Lower Greensand of Atherfield and Blackgang belong to *L. semisulcata*. *L. Tombeckiana* also resembles *L. suprajurensis*, Contejean,[1] found in the Upper Jurassic.

Types.—D'Orbigny does not give the locality of the type, but says that he obtained specimens from the Neocomian of Neuchâtel, Auxerre, Saint Sauveur, etc.

Distribution.—Hythe Beds of Court-at-Street near Lympne. Lower Greensand of Brickhill. Tealby Limestone (zone of *B. brunsvicensis*) of North Willingham.

LIMA (LIMATULA) DUPINIANA, *d'Orbigny*, 1847. Plate VII, figs. 11 *a*—*c*.

? 1845. LIMA SEMISULCATA, *E. Forbes*. Quart. Journ. Geol. Soc., vol. i, p. 248 (non *semisulcata*, Nilsson).

1847. LIMA DUPINIANA, *A. d'Orbigny*. Pal. Franç. Terr. Crét., vol. iii, p. 535, pl. ccccxv, figs. 18—22.

1850. — — *d'Orbigny*. Prodr. de Pal., vol. ii, p. 81.

1854. — — *J. Morris*. Cat. Brit. Foss., ed. 2, p. 171.

1855. — — *G. Cotteau*. Moll. Foss. de l'Yonne, p. 100.

1865. — — *H. Coquand*. Mon. Aptien de l'Espagne, p. 151.

1869. — — *F. J. Pictet and G. Campiche*. Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 150.

1871. RADULA (LIMATULA) DUPINIANA, *F. Stoliczka*. Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 414.

Non 1883. LIMA DUPINIANA, *A. Fritsch*. Stud. im Gebiete der böhm. Kreideformat.: III, Iserschichten, p. 112, fig. 81.

Description.—Shell oval, moderately convex, much higher than long, nearly equilateral, with the posterior margin more convex than the anterior. Umbones very small, pointed, close together. Ears unequal.

Ornamentation consists of from ten to fourteen very narrow radial ribs, usually with sharp summits, separated by broad rounded grooves. The anterior and posterior parts of the shell are without ribs, and the posterior part is considerably larger than the anterior. Very fine concentric ridges are present.

Measurements :

	(1)	(2)	
Length	11	8	mm.
Height	21	14·5	„

(1) Tealby Limestone, North Willingham.

(2) Ferruginous Sands, Shanklin.

[1] 'Kimmérid. de Montbéliard' (1859), p. 351, pl. xxvii, fig. 9; de Loriol and Cotteau, 'Portland. de l'Yonne' (1868), p. 205, pl. xiv, figs. 1, 2.

Affinities.—This species is easily distinguished from *L. Tombeckiana* (see p. 45) by its relatively higher and less inflated form, by the narrow ribs, and by the less symmetrically placed ribbed area.

In its narrow ribs *L. Dupiniana* resembles *L. subæquilateralis*, d'Orbigny (see page 49) but the ribs in the latter are distributed over the greater part of the shell and are more widely separated and more numerous.

The specimens referred to *L. semisulcata* by Forbes are poorly preserved, but probably belong to this species.

Types.—From the Neocomian of Marolles (Aube) and Saint Sauveur (Yonne).

Distribution.—Tealby Limestone (zone of *B. brunsvicensis*) of North Willingham. Ferruginous Sands of Shanklin. Atherfield Beds of Redhill. Hythe Beds of Hythe (*fide* Topley).

LIMA (LIMATULA) FITTONI, *d'Orbigny*, 1850. Plate VII, figs. 12—14, 15 *a*—*c*.

1836. LIMA SEMISULCATA, *J. de C. Sowerby*. Trans. Geol. Soc., ser. 2, vol. iv, pp. 336, 359 (*not* 129, 158), pl. xi, fig. 10.
1850. — FITTONI, *A. d'Orbigny*. Prodr. de Pal., vol. ii, p. 82.
1854. — SEMISULCATA, *J. Morris*. Cat. Brit. Foss., ed. 2, p. 172 (*partim*).
1869. — — *F. J. Pictet and G. Campiche*. Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 166 (*partim*).

Description.—Shell oval, moderately convex, higher than long, slightly inequilateral, with rounded margins, the posterior being more convex than the anterior. Umbones small, close together. Ears equal.

Ornamentation consists of from 13 to 15 radial ribs with sharp summits, separated by narrow grooves. Pointed projections are present on the summits of the ribs, especially near the ventral border of the shell. The anterior and posterior parts of the shell are without ribs. The ribbed area is unsymmetrically placed, and the anterior smooth part of the shell is considerably smaller than the posterior part. Fine concentric ridges are seen on well-preserved specimens.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Length .	10	9	8	8	7	7	6	mm.
Height .	16	14	14	13	12·5	12	10	,,

(1, 3—7) Upper Greensand, Haldon.
(2) ,, ,, Blackdown.

Affinities.—This form was referred by Sowerby (in Fitton) to the Senonian species *L. semisulcata*, Nilsson,[1] but has been regarded by most later writers as distinct from that species, and was named *L. Fittoni* by d'Orbigny.

L. Fittoni differs, as a rule, from *L. semisulcata* in its smaller size, and in having the ribbed area less extensive and much more asymmetrical in position, though occasionally, however, it is nearly symmetrical. It also appears to differ in having a relatively shorter hinge-line and less equilateral form.

For the relation of *L. Fittoni* to *L. Tombeckiana* see p. 46.

Type.—The type is *Lima semisulcata*, Sowerby (*non* Nilsson) from the Upper Greensand of Blackdown. A specimen in the Bristol Museum is regarded as the type, but does not agree very well with the figure.

Distribution.—Upper Greensand (zone of *Schlœnbachia rostrata*) of Blackdown and Haldon. Cenomanian of Axmouth (Bed 12 of Meÿer), Dunscombe (Bed 10), and Pinhay.

LIMA (LIMATULA) SUBÆQUILATERALIS, *d'Orbigny*, 1847. Plate VII, figs. 16*a*, *b*, 17.

1847. LIMA SUBÆQUILATERALIS, *A. d'Orbigny*. Pal. Franç. Terr. Cret., vol. iii, p. 558, pl. cccxxiii, figs. 1—5.
1850. — — *d'Orbigny*. Prodr. de Pal., vol. ii, p. 167.
1870. — — *F. J. Pictet and G. Campiche*. Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 169.
1871. RADULA (LIMATULA) SUBÆQUILATERALIS, *F. Stoliczka*. Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 415.

Description.—Shell oval, or rounded oblong, pointed at the umbones, nearly equilateral, about twice as high as long, of moderate convexity. Anterior margin less curved than the posterior. Ears equal, smooth, with pointed ends.

Ornamentation consists of about 20 very narrow ribs separated by broad, slightly concave, interspaces which are crossed by growth-lines. Ribs are absent near the anterior and posterior margins.

Measurements:

Length	10 mm.
Height	19 ,,

Upper Greensand, Warminster.

Affinities.—See *Lima Dupiniana* (p. 48) and *Lima* sp. (p. 52).

Remarks.—I have seen only two English examples of this species, both of

[1] For references, see p. 51, footnote.

which are more or less imperfect, but after an examination of specimens of *L. subæquilateralis* from Le Mans in the Museum of Palæontology at Paris I am inclined to refer them to that species. In the specimens from Le Mans the number of ribs is sometimes greater than is shown in D'Orbigny's figure, also the ears may be less sharply separated from the valve, and in one case the hinge-line was seen to be relatively longer.

Types.—From the Cenomanian of Le Mans. The specimens here figured are in the British Museum.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Warminster.

LIMA (LIMATULA) DECUSSATA, *Goldfuss*, 1836. Plate VII, figs. 18*a*, *b*, 19, 20*a*, *b*.

1836. LIMA DECUSSATA, *A. Goldfuss.* Petref. Germ., vol. ii, p. 91, pl. civ, fig. 5.
1837. PLAGIOSTOMA GRANULATUM, *W. Hisinger.* Lethæa Suecica, pl. xv, fig. 7.
1841. LIMA DECUSSATA, *F. A. Römer.* Die Verstein. d. nord-deutsch. Kreidegeb., p. 55.
1846. — — *A. E. Reuss.* Die Verstein. der böhm. Kreideformat., pt. 2, p. 32, pl. xxxviii, fig. 15.
1847. — SEMISULCATA, *J. Müller.* Petref. der Aachen. Kreidef., pt. 1, p. 33.
1850. — DECUSSATA, *A. d'Orbigny.* Prodr. de Pal., vol. ii, p. 248.
— — SEMISULCATA, *R. Kner.* Verstein. v. Lemberg (Haidinger's Naturwiss. Abhandl., vol. iii, pt. 2), p. 29.
— — DECUSSATA, *A. Alth.* Geogn.-palæont. Beschreib. v. Lemberg (Haidinger's Naturwiss. Abhandl., vol. iii, pt. 2), p. 241.
— — SEMISULCATA, *Alth.* Ibid., p. 242.
1863. — DECUSSATA, *A. v. Strombeck.* Zeitschr. d. deutsch. geol. Gesellsch., vol. xv, p. 151.
? — — — *S. Placketko.* Das Becken von Lemberg (Jahresb. d. k. zweite Ober-Gymnas. in Lemberg), p. 20, pl. i, fig. 19.
1866. — — *K. A. Zittel.* Die Bivalven d. Gosaugeb. (Denkschr. d. k. Akad. d. Wissensch. Wien, vol. xxv), pt. ii, p. 105, pl. xvi, fig. 4.
1869. — — *E. Favre.* Moll. Foss. de la Craie de Lemberg, p. 136.
1870. — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 174.
1871. RADULA (LIMATULA) DECUSSATA, *F. Stoliczka.* Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 415.
1888. LIMA DECUSSATA, *A. Peron.* L'Hist. du Terr. de Craie, p. 145, pl. i, fig. 18.
1889. — — *E. Holzapfel.* Die Mollusk. Aachen. Kreide (Palæontographica, vol. xxxv), p. 242, pl. xxvii, fig. 4.

1900. Lima decussata, *C. Gagel and F. Kaunhowen.* Jahrb. d. k. preussisch. geol. Landesanst. für 1899, p. 232.
1902. — — *J. P. J. Ravn.* Mollusk. i Danmarks Kridtafl.: I. Lamellibr. (K. Danske Vid. Selsk. Skrift., 6 Række, nat. og. math. Afd., vol. xi), p. 96, pl. ii, fig. 11.
— — — *A. Wollemann.* Fauna d. Lüneburg. Kreide (Abhandl. d. k. preussisch. geol. Landesanst., N. F., Heft 37), p. 57.

Description.—Shell inflated, ovate or rounded-oblong, nearly equilateral. Umbones small. Ears rather small, nearly equal.

Ornamentation consists of numerous sharp ribs, separated by narrow grooves. The ribs become less distinct on the anterior and posterior parts of the shell. Numerous fine concentric ridges occur, and sometimes give rise to a tubercular appearance on the summits of the larger ribs.

Measurements:

	(1)	(2)	(3)	(4)	(5)	
Length .	10	9	7	7	6·5	mm.
Height .	13·5	12	11	10·5	9·5	„

(1, 2, 4, 5) *A. quadratus* zone, East Harnham.
(3) *Uintacrinus* band, Devizes Road, Salisbury.

Affinities.—*L. semisulcata*, Nilsson,[1] is distinguished from *L. decussata* by the ribs being limited to the median part of the shell, and by the relatively higher valves.

Peron thinks that *L. pectinata*, d'Orbigny, may be only a variety of *L. decussata*. It appears to differ from the latter in having the ribs more tubercular and usually fewer in number.

Type.—From the Senonian of Rinkerode, near Münster.

Distribution.—*Uintacrinus* band of Devizes Road, Salisbury. Zone of *Actinocamax quadratus* of East Harnham and Ashley Hill. Zone of *Belemnitella mucronata* of Clarendon.

Lima (Limatula) wintonensis, sp. nov. Plate VII, figs. 21 *a*, *b*, 22 *a*—*d*.

Description.—Shell inflated, ovate, nearly equilateral, pointed dorsally.

Ornamentation consists of 15 or 16 strong, rounded ribs on the median part of the valve only. The ribs are separated by very narrow grooves, and bear many

[1] 'Petrif. Suecana' (1827), p. 25, pl. ix, fig. 3; Hennig, Revis. Lamell. i Nilsson's 'Petrif. Suecana' (1897), p. 28, pl. ii, figs. 14, 17.

strong ridges placed concentrically and regularly. Below a growth-ring the ridges are sometimes situated more closely together. One or two ribs at the margins of the ribbed area are rather smaller than the others. The parts between the ribbed area and the anterior and posterior margins of the valve are smooth except for faint growth-lines.

Measurements :

	(1)	(2)	(3)	(4)	(5)
Length .	7	6	5·5	5·5	5 mm.
Height .	10	8	8	7·5	7 „

(1) Chalk, Clayton.
(2—5) *A. quadratus* zone, Winchester.

Affinities.—This species is distinguished from *L. decussata* (p. 50) by being more pointed dorsally, by having fewer ribs, which also are rounded and confined to the median part of the valve, and by the strong ridges which extend across the ribs.

In outline this species resembles *Lima pectinata*, d'Orbigny,[1] but differs in having fewer ribs, in the absence of ribs on the anterior and posterior parts of the valves, and in the ribs not being carinated and having ridges across them instead of tubercles at the summits.

This species resembles closely the form figured by Geinitz[2] as *L. semisulcata*, Nilsson.

Distribution.—Zone of *Actinocamax quadratus* of Winchester. Upper Chalk (probably zone of *Micraster cor-testudinarium*) of Kenley.

Lima (Limatula), sp. Plate VII, fig. 23 *a*, *b*.

Description.—Shell inflated, oval, nearly equilateral. Umbones small. Hinge-line relatively long. Ears not sharply limited, nearly equal.

Ornamentation consists of about 20 narrow ribs, separated by very broad and shallow interspaces in which very fine radial ribs may be seen. The ribs anterior to the median line are closer together and rather stronger than the others. On the parts of the valves next to the ears ribs appear to be absent.

Measurements :

Length	6·5 mm.
Height	9 „

[1] 'Pal. Franç. Terr. Crét.,' vol. iii (1847), p. 572, pl. ccccxxvii, figs. 15—19.
[2] 'Das Elbthalgeb. in Sachsen,' pt. 2 (1873), p. 53, pl. xvi, fig. 14.

Affinities.—In the character of its ornamentation this form resembles *Lima subæquilateralis*, d'Orbigny (see p. 49), from the Cenomanian of Le Mans, but the shell is not so high, is less pointed in the umbonal region, and has a longer hinge-line.

In outline this form resembles the example figured by Ravn[1] as *Lima Forchhammeri*, von Hagenow, but possesses a much larger number of ribs.

Remarks.—I have seen one specimen only, which is in Dr. Blackmore's collection.

Distribution.—Zone of *Belemnitella mucronata* of Clarendon (Salisbury).

Sub-genus—Limea, *H. G. Bronn*, 1831.

('Italiens Tertiär-Gebilde und deren Organische Einschlüsse,' p. 115.)

Lima (Limea?) composita (*Sowerby*), 1836. Plate VII, figs. 24*a*, *b*, 25*a*, *b*, 26.

1836.	Pecten compositus,	*J. de C. Sowerby.*	Trans. Geol. Soc., ser. 2, vol. iv, pp. 241, 342, pl. xvii, fig. 20.
1847.	Lima cenomanensis,	*A. d'Orbigny.*	Pal. Franç. Terr. Crét., vol. iii, p. 552, pl. ccccxxi, figs. 11—15.
1850.	— —	*d'Orbigny.*	Prodr. de Pal., vol. ii, p. 167.
1867.	— —	*E. Guéranger.*	Album Paléont. de la Sarthe, p. 19, pl. xxiv, figs. 4, 9.
1870.	— —	*F. J. Pictet and G. Campiche.*	Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), pp. 161, 168.
1871.	Limea —	*F. Stoliczka.*	Palæont. Indica, Cret. Fauna S. India, vol. iii, p. 416.
1882.	Lima —	*R. Windmöller.*	Jahrb. d. k. preussisch. geol. Landesanst. für 1881, pp. 24, 29.

Measurements:

	(1)	(2)	(3)	(4)	(5)	(6)	
Length	12·5	11	10	9	9	8	mm.
Height	15	13	11·5	10·25	10	9·5	,,

(1, 3—6) Upper Greensand, Warminster.
(2) Rye Hill Sand, Maiden Bradley.

Affinities.—This form is closely related to *Lima granulata* (see below). The ornamentation appears to have been similar in both cases, but in *L. composita* the scale-like spines on the ribs are much less perfectly preserved and usually appear as tubercles only. In *L. composita* the shell appears to be rather less oblique and

[1] 'Molluskerne i Danmarks Kridtaflej. I. Lamellibr.' (1902), p. 97, pl. ii, fig. 12.

more nearly equilateral than in *L. granulata;* the height is also slightly greater and the umbones rather more prominent; the ribs appear to be narrower and to have sharper summits. The smaller convexity of *L. composita* mentioned by d'Orbigny does not seem to be constant.

Remarks.—An examination of the type of *Pecten compositus*, Sowerby, shows that it is an example of this species (see Vol. I, p. 188, footnote), and consequently the specific name *composita* must take the place of *cenomanensis.*

The French examples which I have seen are, on the average, larger than the English.

Types.—The type of *L. cenomanensis* came from the Cenomanian of Le Mans. The type of *Pecten compositus* is in the Bristol Museum; it is labelled "Blackdown" but is not siliceous and is more probably from Warminster.

Distribution.—Upper Greensand (zone of *Pecten asper*) of Warminster. Rye Hill Sand of Maiden Bradley. I have not seen the specimens recorded in the Memoirs of the Geological Survey from the zones of *Schlœnbachia varians* and *Holaster subglobosus* of Hunstanton.

LIMA (LIMEA?) GRANULATA (*Nilsson*), 1827. Plate VII, figs. 27*a*—*c*, 28, 29*a*, *b*.

1827. PLAGIOSTOMA GRANULATUM, *S. Nilsson.* Petrif. Suecana, p. 26, pl. fig. 4.
1833. — GRANULOSUM, *S. Woodward.* Geol. Norfolk, pp. 48, 51, pl. v, fig. 26.
1836. LIMA GRANULATA, *A. Goldfuss.* Petref. Germ., vol. ii, p. 89, pl. ciii, fig. 5.
1837. PLAGIOSTOMA GRANULATUM, *W. Hisinger.* Lethæa Suecica, p. 54 (*not* the figure, pl. xv, fig. 7).
1841. LIMA MURICATA, *F. A. Römer.* Die Verstein. d. nord-deutsch. Kreidegeb., p. 55.
1842. — GRANULATA, *F. v. Hagenow.* Neues Jahrb. für Min., etc., p. 555.
1846. — — *A. E. Reuss.* Die Verstein. der böhm. Kreideformat., pt. 2, p. 32, pl. xxxviii, fig. 21.
1847. — — *A. d'Orbigny.* Pal. Franc. Terr. Crét., vol. iii, p. 570, pl. ccccxxvii, figs. 5—9. (Named *L. granosa* on plate.)
1850. — — *d'Orbigny.* Prodr. de Pal., vol. ii, p. 248.
1851. — PSEUDOCARDIUM, INFLATA ET DENTATA, *J. Müller.* Petref. der Aachen. Kreidef., pt. 2, pp. 67, 68.
1855. — GRANULATA, *G. Cotteau.* Moll. Foss. de l'Yonne, p. 102.
1870. — — *C. Schlüter.* Neues Jahrb. für Min., etc., p. 950.
— — — *F. J. Pictet and G. Campiche.* Foss. Terr. Crét. Ste. Croix (Matér. Pal. Suisse, ser. 5), p. 170.

1876. Limæa granulata, *D. Brauns.* Zeitschr. f. d. gesammt. Naturwiss., vol. xlvi, p. 386.
? — Lima granulata, *H. Deicke.* Die Tourtia von Mülheim a. d. Ruhr, p. 27.
1881. Limea granulata, *K. A. Zittel.* Handb. d. Palæont., vol. ii, p. 27.
1888. Lima granulata, *A. Peron.* L'Hist. Terr. de Craie, p. 147.
1889. Limea granulata, *O. Griepenkerl.* Senon. von Königslutter (Palæont. Abhandl., vol. iv), p. 41.
— Lima granulosa, *E. Holzapfel.* Die Mollusk. Aachen. Kreide (Palæontographica, vol. xxxv), p. 239, pl. xxvii, fig. 6.
— — granulata, *A. Fritsch.* Stud. im Gebiete der böhm Kreideformat.: IV, Teplitz. Schicht., p. 83, fig. 76.
1893. — — *Fritsch.* Ibid., V, Priesener Schicht., p. 100.
1894. — — *B. Lundgren.* Mollusk-faunan i *Mammill.* och *Mucron.* zonerna (K. SvenskaVet.-Akad. Handl., N. F., vol. xxvi, No. 6), p. 42.
1897. — — *A. Hennig.* Revis. Lamell. i Nilsson's 'Petrific. Suecana' (K. Fys. Sällsk. i Lund. Handl., N. F., vol. viii), p. 26, pl. ii, figs. 6—8.
1898. — — *G. Müller.* Mollusk. d. Untersen. v. Braunschweig u. Ilsede (Abhandl. d. k. preussisch. geol. Landesanst., N. F., Heft 25), p. 29, pl. iv, fig. 6.
1901. — — *A. Wollemann.* Jahrb. d. k. preussisch. geol. Landesanst. für 1900, vol. xxi, p. 16.
1902. — — *Wollemann.* Lüneburg. Kreide (Abhandl. d. k. preussisch. geol. Landesanst., N. F., Heft 37), p. 57.
— — — *J. P. J. Ravn.* Mollusk i Danmarks Kridtaflej. I. (K. Danske Vid. Selsk. Skrift., 6 Række, nat. og. math. Afd., vol. xi), p. 101.

Non 1837. — — *F. Dujardin.* Mém. Soc. géol. de France, vol. ii, p. 226, pl. xvi, fig. 4 (= *L. Meslei*, Peron, 1888).

Description.—Shell very convex, oval, slightly oblique, with rounded outline; height a little greater than length. Apical angle very large. Umbones small, incurved, close together. Ears of moderate size, nearly equal, rather low and long, with a few spiny ribs.

Ornamentation consists of numerous (usually from 22 to 24) strong ribs with sharp summits, separated by narrow furrows. Each rib bears three rows of scale-like spines, one row being at the summit and one on each side. The spines are placed near together, at regular intervals, and curve upwards from the surface of the shell, the terminal parts sometimes becoming quite erect. The middle row is rather larger than the rows on the sides. In some cases the spines are represented by granules. On the anterior and posterior parts of the shell the ribs may be

smaller than elsewhere, but the middle rows of spines are here often relatively larger.

Measurements :

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Length	19	16	15	11	10	10	10	8	9·5	16	21	mm.
Height	21	18	16	12·5	11	10·5	11	9	10	18	?24	„

(1—5) *B. mucronata* zone, Norwich.
(6) „ „ Alderbury.
(7) *A. quadratus* zone, East Harnham.
(8) *B. mucronata* zone, Clarendon.
(9—11) Chalk of Trimingham.

Affinities.—The form from the Lower Senonian of Touraine described and figured as *Lima granulata* by Dujardin, is regarded by Peron [1] as belonging to another species which he names *Lima Meslei.* Peron states that *L. Meslei* differs from *L. granulata* in having more numerous ribs ornamented with fine granules of which the middle row is not larger than the lateral rows; further, the ribs disappear on the anterior and posterior parts of the shell, and the ears are without ornamentation.

Radula scabricula, Stoliczka,[2] from the Arrialoor Group, is closely related to *Lima granulata*, but owing to the imperfect preservation of the single valve on which the species is founded, an exact comparison is not possible. The ornamentation, however, seems to differ, since it apparently consists of small tubercles of nearly equal size. It has been suggested by Holzapfel and Hennig that *Lima pseudocardium*, Reuss,[3] may be identical with *L. granulata*, but the ornamentation on the ribs of that species appears to be unknown.

Remarks.—This species has been referred to *Limea* by Brauns, Zittel, and Griepenkerl, but later writers—Holzapfel, Hennig, and Ravn—retain it in the genus *Lima* since they find no evidence of the existence of a taxodont hinge. The specimens which I have seen do not show the hinge.

The outline of the shell varies to some extent in *L. granulata*, depending mainly on the obliquity of the valves. The appearance of the ribs varies considerably and is probably due chiefly to the state of preservation; in the more perfect specimens the terminations of the scale-like spines become erect, in others the spines are in the form of sloping scales, whilst in some cases they are represented by tubercles only. The number of ribs also shows variation.

[1] 'L'Hist. du Terr. de Craie' (1888), p. 148, pl. i, figs. 21—24.

[2] 'Palæont. Indica, Cret. Fauna S. India' (1871), vol. iii, p. 419, pl. xxx, fig. 8.

[3] 'Die Verstein. der böhm. Kreideformat.' (1846), pt. 2, p. 33, pl. xxxviii, figs. 2, 3; Geinitz, "Das Elbthalgeb. in Sachsen" ('Palæontographica,' vol. xx, pt. 1, 1872), p. 204, pl. xlii, figs. 14, 15: see also Brauns (1876), Fritsch (1877, 1883), Michael (1893), Leonhard (1897).

The figures are of natural size *unless the amount of enlargement or reduction is stated.*

PLATE I.

Genus—LIMA, *Bruguière.*

Lima canalifera, Goldfuss. Upper Greensand (zone of *Pecten asper*), Ventnor. Sedgwick Museum, Cambridge; except fig. 2, York Museum. (P. 1.)

1, 5, 6 *a*, 7 *a*, left valves; 6 *b*, antero-dorsal view; 7 *b*, portion × 2.
2, 3, 4, right valves.

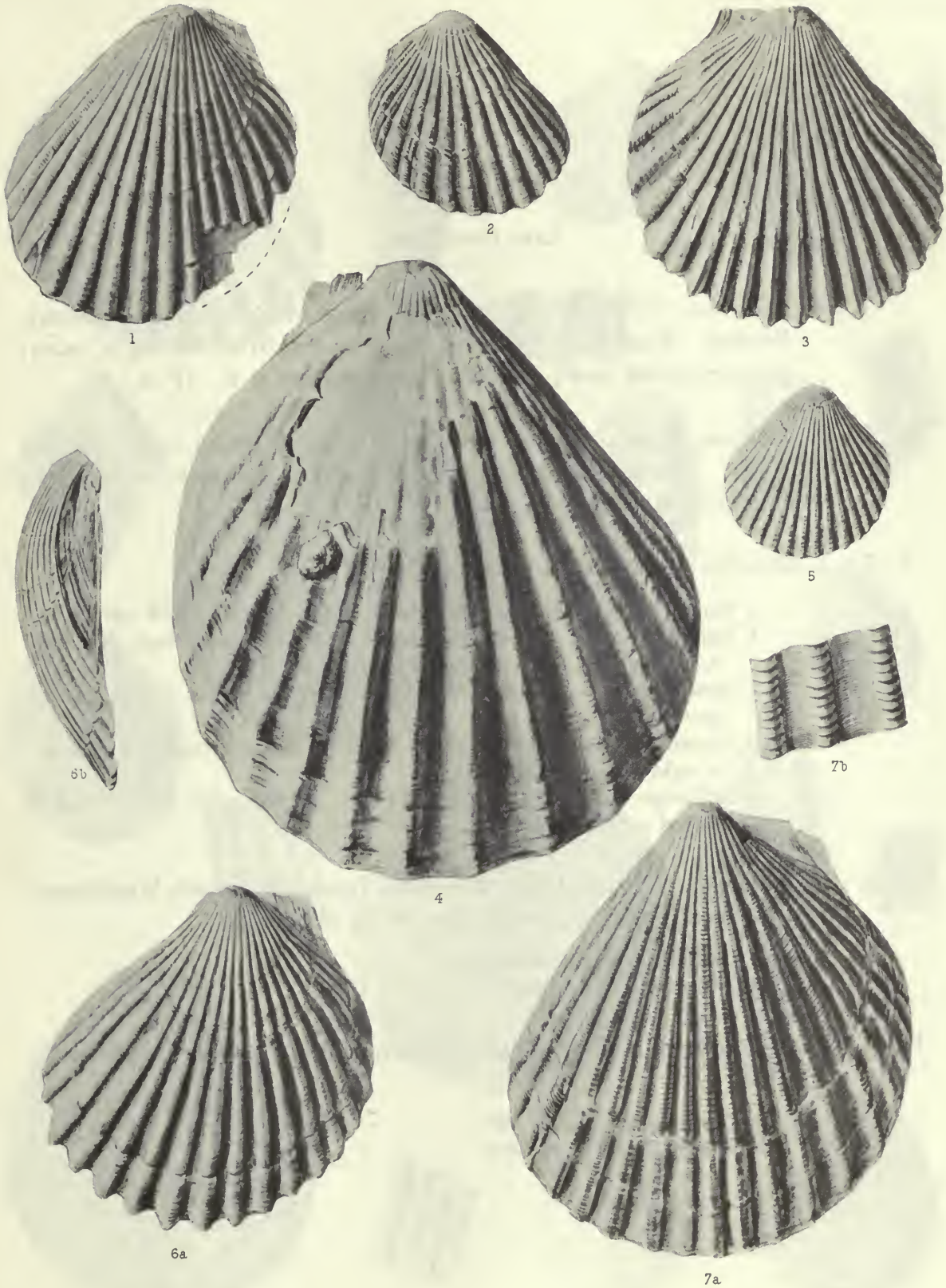

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PLATE II.

LIMA (*continued*).

FIGS.

1. *L. Galliennei*, d'Orb. Upper Greensand (zone of *Schlœnbachia rostrata*), Devizes. Museum of Practical Geology, No. 8798. *a*, right valve; *b*, antero-dorsal view; *c*, antero-ventral portion × 3. (P. 3.)

2. *L. vectensis*, Woods. Upper Greensand (zone of *Pecten asper*), Isle of Wight. Ventnor Institute. *a*, left valve; *b*, antero-dorsal view; *c*, portion × 3. (P. 4.)

3—7. *L. subovalis*, Sow. (P. 5.)

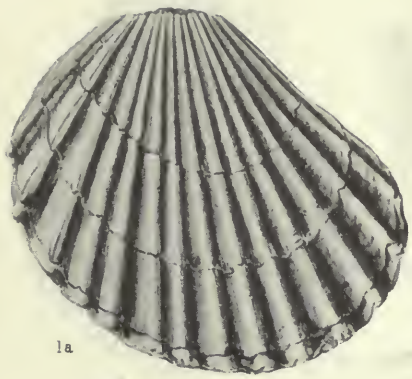
3. Upper Greensand, probably Warminster. Bristol Museum. Left valve × 1½.
4. Upper Greensand, Warminster. Museum of Practical Geology, No. 8805. *a*, right valve × 1½; *b*, antero-dorsal view × 1½.
5. Same horizon, etc. No. 8804. Left valve. *a*, median portion × 8; *b*, posterior portion × 8.
6. Greensand bed at the base of the Chalk, Folkestone. Sedgwick Museum. *a*, right valve; *b*, portion × 8.
7. Cambridge Greensand. Sedgwick Museum. *a*, right valve × 1½; *b*, antero-ventral portion × 8.

8, 9. *L. scabrissima*, Woods. Upper Greensand (zone of *P. asper*), Warminster. Museum of Practical Geology, Nos. 8815, 8816. (P. 7.)

8 *a*, left valve; *b*, antero-dorsal view.
9 *a*, right valve; *b*, portion × 4.

10, 11. *L. aspera* (Mant.). Lower Chalk (Totternhoe Stone). Sedgwick Museum. (P. 8.)

10. Cherry Hinton. Right valve.
11. Cherry Hinton. Left valve.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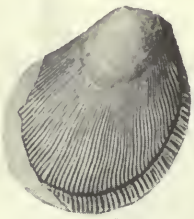
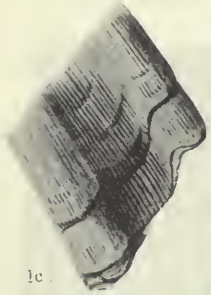
1b


3

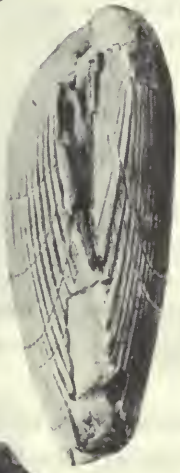

4a


4b


2c


1c


2a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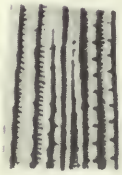
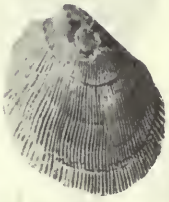
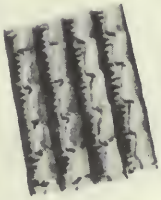

5a


5b


6a


7a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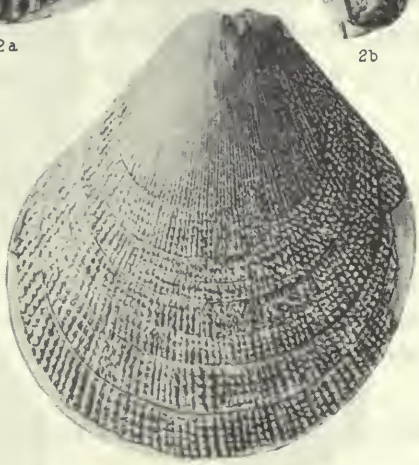
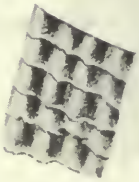

8a


8b


6b


9a


9b


10

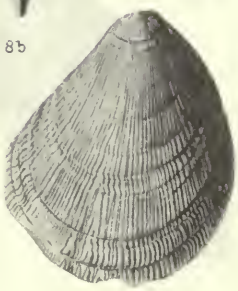

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PLATE III.

Lima (*continued*).

Figs.

1—4. *L. aspera* (Mant.). Lower Chalk (Totternhoe Stone). 1—3. Sedgwick Museum. 4. York Museum. (P. 8.)

1. Burwell. *a*, right valve × 1½; *b*, median portion × 6.
2. Cherry Hinton. Left valve.
3. Burwell. Anterior area of right valve × 1½.
4. Burwell. Right valve.

5—9. *L.* (*Plagiostoma*) *subrigida*, Römer. Claxby Ironstone, Benniworth Haven. Sedgwick Museum (P. 10.)

5 *a*. Right valve; *b*, antero-dorsal view.
6. Left valve.
7. Antero-ventral part of right valve.
8. Portion of right valve × 6.
9. Left valve. Portion of a young individual × 8.

10. *L.* (*Plagiostoma*) sp., cf. *Orbignyana*, Matheron. Lower Greensand (Ferruginous Sands), Shanklin. British Museum, No. L 15754. *a*, right valve × 1½; *b*, anterior view of the same × 1½; *c*, portion × 6. (P. 12.)

11—13. *L.* (*Plagiostoma*) *villersensis?* Pict. and Camp. Lower Greensand, Faringdon. Sedgwick Museum. (P. 13.)

11 *a*, left valve × 1½; *b*, portion × 4.
12 *a*, left valve × 1½; *b*, anterior view, natural size.
13. Left valve.

14—16. *L.* (*Plagiostoma*) *semiornata*, d'Orb. Upper Greensand, Ventnor. (P. 14.)

14. York Museum. Left valve.
15. Sedgwick Museum. Right valve.
16. York Museum. Left valve. *a*, anterior part × 3; *b*, postero-dorsal part × 3.

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PLATE IV.

LIMA (*continued*).

FIGS.

1. *L.* (*Plagiostoma*) *semiornata*, d'Orb. Upper Greensand, Ventnor. York Museum. Left valve. Portions of this specimen are enlarged on pl. iii, figs. 16 *a*, *b*. (P. 14.)

2, 3. *L.* (*Plagiostoma*) *Meyeri*, Woods. Upper Greensand, Warminster. (P. 15.)

2. Right valve. Museum of Practical Geology, No. 8839.
3. Left valve. Sedgwick Museum, Cambridge.

4—6. *L.* (*Plagiostoma*) *globosa* (Sow). Lower Chalk. 4, 5. Totternhoe Stone, Burwell. 6. Zone of *Holaster subglobosus*, Fulbourn. Sedgwick Museum. (P. 16.)

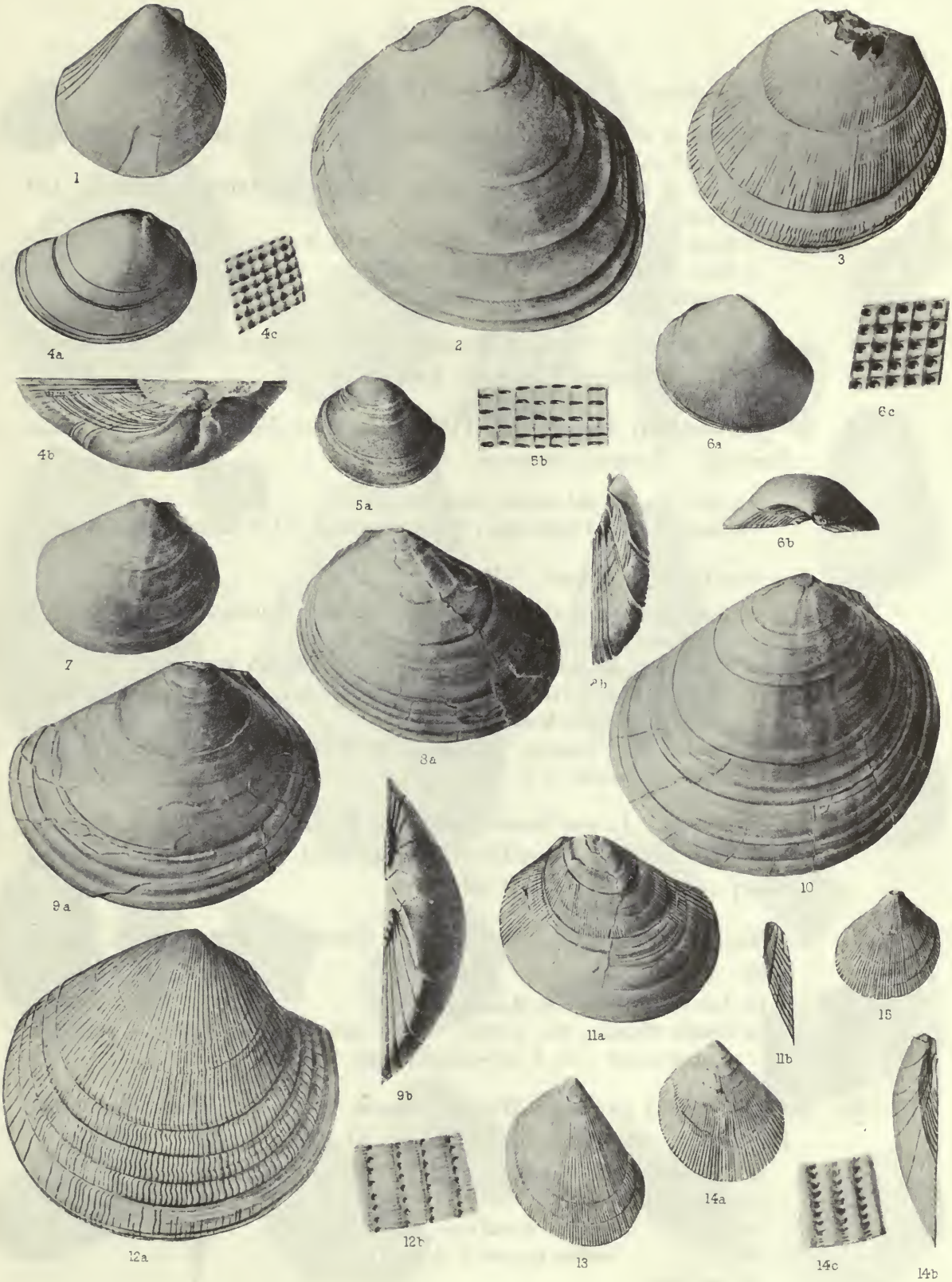
4 *a*, left valve; *b*, dorsal view × 1½; *c*, portion × 12.
5 *a*, right valve; *b*, mid-ventral portion × 12.
6 *a*, right valve; *b*, dorsal view; *c*, median portion × 12.

7—12. *L.* (*Plagiostoma*) *Hoperi*, Mant. (P. 17.)

7—10. Zone of *Actinocamax quadratus*, East Harnham. Dr. Blackmore's collection 7. Left valve; 8 *a*, right valve; 8 *b*, anterior area of left valve; 9 *a*, left valve 9 *b*, dorsal view; 10, left valve.
11. Zone of *Belemnitella mucronata*, Norwich. Norwich Museum. 11 *a*, right valve; 11 *b*, anterior area of the same.
12. Zone of *Micraster cor-anguinum*, Gravesend. Mr. Dibley's collection. 12 *a*, left valve; 12 *b*, portion × 6.

13—15. *L.* (*Plagiostoma*) *cretacea*, Woods. Dr. Blackmore's collection. (P. 22.)

13, 15. Zone of *Actinocamax quadratus*, East Harnham. 13. Right valve × 1½. 15. Left valve.
14. Upper part of zone of *A. quadratus*, Whaddon railway cutting. *a*, right valve: *b*, antero-dorsal view × 1½; *c*, portion × 6.



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CRETACEOUS LAMELLIBRANCHIA

PLATE V.

Lima (*continued*).

Figs.

1—4. *L.* (*Plagiostoma*) *cretacea*, Woods. (P. 22.)

1. Zone of *Actinocamax quadratus*, East Harnham. Dr. Blackmore's Collection. *a*, left valve; *b*, portion × 6.
2. Zone of *Micraster cor-testudinarium*, Borstal. Mr. Dibley's Collection. Left valve.
3. Zone of *Holaster planus*, Cheveley. Sedgwick Museum. Left valve.
4. Zone of *Micraster cor-testudinarium*, Cuxton. Mr. Dibley's Collection. *a*, left valve; *b*, postero-ventral portion × 4.

5. *L.* (*Plagiostoma*) sp. (? var. of *cretacea*). Chalk (? zone of *Holaster planus*), Burham. Sedgwick Museum. Left valve.

6, 7. *L.* (*Plagiostoma*) *Marrotiana*, d'Orb. Zone of *Belemnitella mucronata*, Norwich. Norwich Museum. (P. 24.)

6 *a*, left valve; *b*, mid-ventral portion × 3.
7 *a*, anterior area of right valve; *b*, median portion of left valve of same specimen.

8—12. *L.* (*Acesta*) *longa*, Römer. (P. 25.)

8. Lower Greensand, Upware. Mr. J. F. Walker's Collection. *a*, right valve; *b*, portion below the middle of the valve × 5.
9, 10. Lower Greensand, Brickhill. Right valves. Sedgwick Museum.
11. Tealby Limestone (zone of *Belemnites brunsvicensis*), North Willingham. Right valve. Sedgwick Museum.
12. Speeton Clay, Speeton. Museum of Practical Geology, No. 8781. *a*, right valve; *b*, portion × 4.

13. *L.* (*Acesta*) sp. Lower Greensand, West Dereham. Sedgwick Museum (collected by Mr. Jukes-Browne). *a*, right valve; *b*, antero-dorsal view; *c*, portion × 5. (P. 26.)

14, 15. *L.* (*Mantellum*) *parallela*, Sow. Lower Greensand (*Perna*-bed), Atherfield. (P. 28.)

14. Left valve. Sedgwick Museum.
15. British Museum, No. L 5066. *a*, left valve; *b*, dorsal view; *c*, portion at anterior end × 3; *d*, mid-ventral portion × 6.

16—20. *L.* (*Mantellum*) *gaultina*, Woods. Gault. 16—19, Black Ven. 20, Folkestone. Sedgwick Museum. (P. 31.)

16 *a*, left valve; *b*, antero-dorsal view.
17. Right valve.
18*a*, ,, *b*, antero-dorsal view.
19. ,, median portion × 6.
20. Left valve

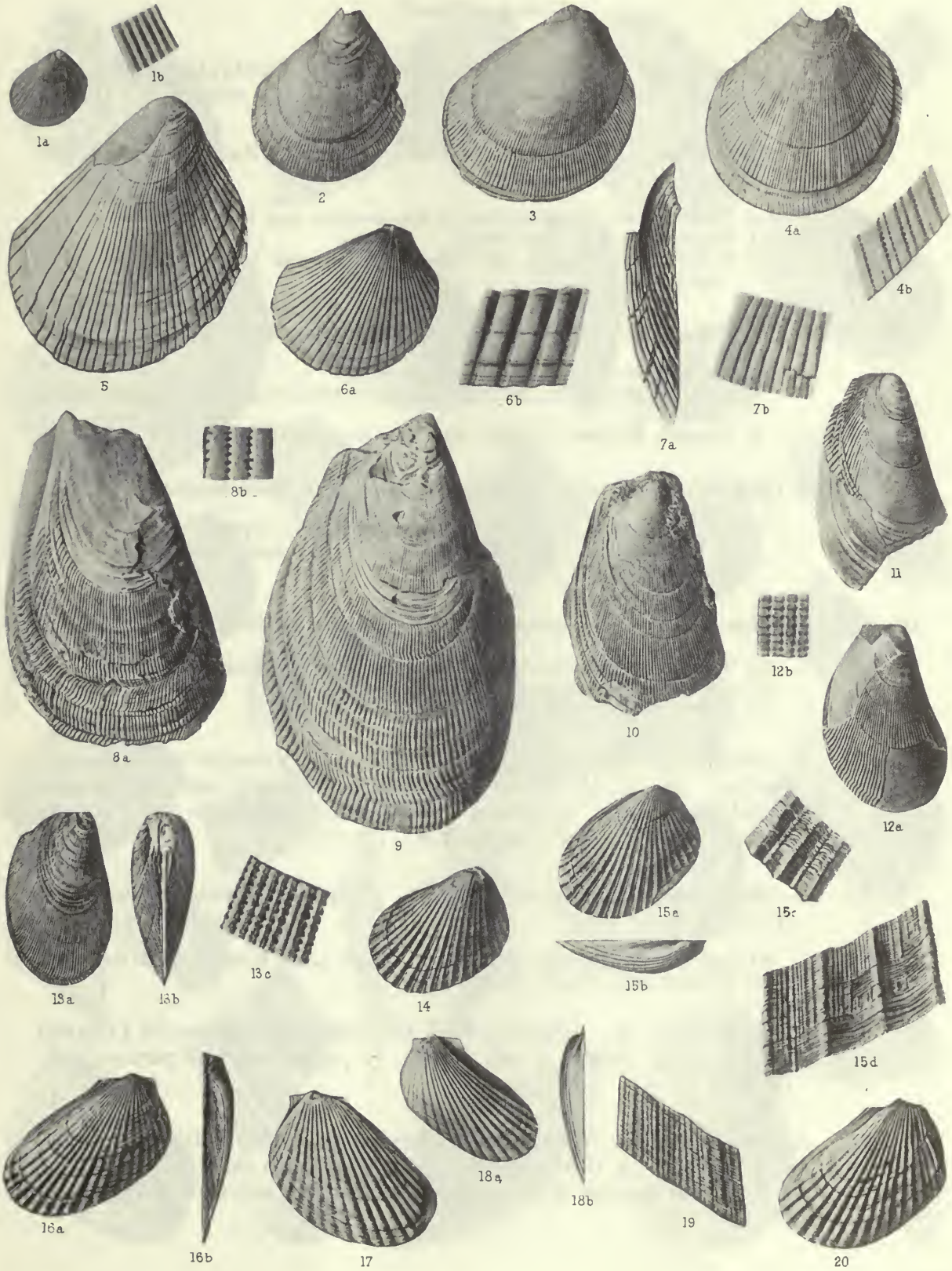
1b
1a
2
3
4a
4b
5
6a
6b
7a
7b
8b
8a
9
10
11
12b
12a
13a
13b
13c
14
15a
15c
15b
15d
16a
16b
17
18a
18b
19
20

PLATE VI.

LIMA (*continued*).

FIGS.

1. *L.* (*Mantellum*) *interlineata*, Jukes-Browne. Cambridge Greensand, Cambridge. *a*, right valve; *b*, ventral part of left valve × 3. (P. 32.)

2—4. *L.* (*Mantellum*) *intermedia*, d'Orb. Rye Hill Sands, Warminster. (P. 33.)

2. York Museum. *a*, right valve; *b*, antero-ventral part × 4.
3. Brighton Museum. Left valve.
4. Sedgwick Museum. *a*, right valve; *b*, antero-dorsal view; *c*, posterior ear of right valve × 4.

5—7. *L.* (*Mantellum*) *elongata*, Sow. Chalk Marl, Folkestone. (P. 34.)

5. Mr. J. F. Walker's Collection. Right valve.
6. Sedgwick Museum. *a*, left valve; *b*, antero-dorsal view; *c*, mid-ventral portion × 3.
7. Sedgwick Museum. *a*, right valve; *b*, antero-ventral part × 8.

8, 9. *L.* (*Mantellum*) *elongata*, var. *echinata*, Eth. Sedgwick Museum. (P. 36.)

8. Totternhoe Stone, Burwell. Left valve. One of the types.
9. *H. subglobosus* zone, Burwell. *a*, left valve; *b*, antero-ventral portion × 4; *c*, posterior portion × 4.

10—12. *L.* (*Mantellum*) *cantabrigiensis*, Woods. Sedgwick Museum. (P. 37.)

10. The type. Cambridge Greensand. *a*, left valve; *b*, posterior portion × 6.
11. Antero-ventral portion of left valve × 6.
12. Lower Chalk, Burwell. Right valve × 1½.

13. *L.* (*Mantellum*) *britannica*, Woods. Zone of *Micraster cor-anguinum*, Seaford. Mr. R. M. Brydone's Collection. *a*, right valve; *b*, antero-dorsal view × 1½; *c*, portion at antero-ventral margin × 6; *d*, portion at postero-ventral margin × 6. (P. 38.)

14, 15. *L.* (*Mantellum*) *Reichenbachi*, Geinitz. Sedgwick Museum, Cambridge. (P. 39.)

14. Cenomanian Sandstone, Wilmington. *a*, left valve; *b*, antero-dorsal view.
15. Chloritic Marl, Chard. Right valve.

16. *L.* (*Mantellum*), sp. Chloritic Marl, Chardstock. Museum of Practical Geology, No. 7896. *a*, left valve; *b*, postero-ventral portion × 6. (P. 40.)

17. *L.* (*Ctenoides*) *rapa*, d'Orb. Upper Greensand, Haldon. British Museum, No. L 15612. *a*, right valve; *b*, median portion a short distance above the ventral margin × 3; *c*, portion near the anterior margin × 5. (P. 40.)

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CRETACEOUS LAMELLIBRANCHIA.

PLATE VII.

Lima (*continued*).

Figs.

1. *L.* (*Ctenoides*) *rapa*, d'Orb. Upper Greensand, Haldon. British Museum, No. L 15613. Right valve. (P. 40.)

2, 3. *L.* (*Ctenoides*) *tecta*, Goldf. Chalk Marl (Bed 11), Dunscombe. Sedgwick Museum. 2, left valve. 3, mid-ventral portion of another specimen × 2. (P. 42.)

4—6. *L.* (*Ctenoides*) *divaricata*, Duj. (P. 44.)

4. Chalk, Newtimber. Brighton Museum. *a*, right valve; *b*, median portion above the middle of the valve × 4; *c*, postero-ventral portion × 4; *d*, median portion near the ventral margin × 4.
5. *Belemnitella mucronata* zone, Norwich. Sedgwick Museum. Left valve.
6. *Micraster cor-anguinum* zone, Micheldever. Winchester College. *a*, portion of left valve; *b*, portion of the same × 8.

7—9. *L.* (*Limatula*) *Tombeckiana*, d'Orb. Hythe Beds, Court-at-Street. Museum of Practical Geology. (P. 45.)

7. No. 8821. *a*, left valve × 1½; *b*, ventral portion × 5.
8. No. 8822. *a*, right valve × 1½; *b*, anterior view × 1½; *c*, ventral portion × 5.
9. No. 8824. *a*, right valve × 2; *b*, anterior view × 2.

10. *L.* (*Limatula*) *Tombeckiana ?*, d'Orb. Upper Greensand, Charmouth. Museum of Practical Geology, No. 8818. Right valve × 2. (P. 46.)

11. *L.* (*Limatula*) *Dupiniana*, d'Orb. Tealby Limestone, North Willingham. Sedgwick Museum. *a*, right valve; *b*, anterior view; *c*, ventral part of ribbed area × 8. (P. 47.)

12—15. *L.* (*Limatula*) *Fittoni*, d'Orb. Upper Greensand, Haldon. (P. 48.)

12. Sedgwick Museum. Left valve × 2.
13. Sedgwick Museum. Right valve × 1½.
14. British Museum, No. L 15615. Right valve × 1½.
15. British Museum, No. L 15615. *a*, left valve; *b*, posterior view; *c*, ventral portion × 3.

16, 17. *L.* (*Limatula*) *subæquilateralis*, d'Orb. Upper Greensand, Warminster. British Museum, No. 88928. (P. 49.)

16 *a*, left valve × 1½; 16 *b*, anterior view × 1½. 17, ventral portion × 6.

18—20. *L.* (*Limatula*) *decussata*, Goldf. *Actinocamax quadratus* zone, East Harnham. Dr. Blackmore's collection. (P. 50.)

18 *a*, right valve × 2; *b*, ventral portion × 6.
19. Median portion × 9.
20 *a*, right valve × 2; *b*, anterior view × 2.

21, 22. *L.* (*Limatula*) *wintonensis*, Woods. (P. 51.)

21. Chalk, Clayton. Brighton Museum. *a*, right valve × 2; *b*, median portion × 6.
22. *Actinocamax quadratus* zone, Winchester. Dr. Rowe's collection. *a*, right valve × 2; *b*, anterior view × 2; *c*, posterior view × 2; *d*, median portion × 8.

23. *L.* (*Limatula*) sp. *Belemnitella mucronata* zone, Clarendon. Dr. Blackmore's collection. *a*, right valve × 2; *b*, ventral portion × 9. (P. 52.)

24—26. *L.* (*Limea ?*) *composita* (Sow). Upper Greensand, Warminster. (P. 53.)

24. Museum of Practical Geology, No. 8786. *a*, right valve × 2; *b*, anterior view × 2.
25. Museum of Practical Geology, No. 8783. *a*, right valve; *b*, median part × 6.
26. Museum of Practical Geology, No. 8784. Left valve × 1½.

27—29. *L.* (*Limea ?*) *granulata*, (Nilss). *Belemnitella mucronata* zone. (P. 54.)

27. Norwich. Norwich Museum. *a*, left valve; *b*, anterior view; *c*, portion × 6, with section of a main rib.
28. Norwich. Sedgwick Museum. Left valve × 1½.
29. Alderbury. Dr. Blackmore's collection. *a*, right valve × 1½; *b*, median portion × 8.

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