THE

MESOZOIC PALAEONTOLOGY

OF

BRITISH SOMALILAND

FORAMINIFERA.. ..	*by*	W. A. Macfadyen, M.C., M.A., PH.D.
CORALS AND HYDROZOA	,,	H. Dighton Thomas, M.A., PH.D.
ECHINOIDEA (JURASSIC)	,,	Ethel D. Currie, PH.D., B.SC.
,, (CRETACEOUS) ..	,,	H. L. Hawkins, D.SC.
CRINOIDEA ..	,,	F. A. Bather, M.A., D.SC., F.R.S.
BRACHIOPODA	,,	Helen M. Muir-Wood, M.SC.
GASTROPODA AND LAMELLIBRANCHIA	,,	L. R. Cox, M.A.
CEPHALOPODA ..	,,	L. F. Spath, D.SC.

Part II of the
Geology and Palaeontology of
British Somaliland

Price £1 10*s.* 0*d.* net

Published by the Government of the Somaliland Protectorate
January, 1935

Copies may be obtained from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, or through any Bookseller.

IX. CRETACEOUS GASTROPODA AND LAMELLIBRANCHIA.

By L. R. COX, M.A.,
Department of Geology, British Museum (Natural History).

[PLATES XXII, XXIII.]

CONTENTS.

I. INTRODUCTION.

Although the late Professor J. W. Gregory (1900, p. 43) recorded certain gastropods and lamellibranchs from British Somaliland which R. B. Newton had determined as Cretaceous species, these records were subsequently corrected by the latter authority (1905, pp. 163, 164, 166, 167, 170), who showed that the specimens in question belonged to Tertiary species.* The collections made by Mr. R. A. Farquharson, Messrs. W. A. Macfadyen and J. A. Hunt, and Mr. C. Barrington Brown, which form the subject of the present Report, include, however, mollusca which belong to at least two distinct stages of the Cretaceous system.

Limestones of Lower Cretaceous age were found by Mr. C. Barrington Brown in the neighbourhood of Madashon, in eastern British Somaliland (localities B. 70, B.78, B.79). Besides ammonites which Dr. L. F. Spath has referred to the Barremian (see Brown, 1931, p. 264), these beds yielded the following lamellibranchs :—*Isognomon* cf. *ricordeanum* (d'Orbigny), *Exogyra* cf. *latissima* Lamarck, *Neithea* sp., and *Pholadomya alternans* Roemer. This Lower Cretaceous fauna appears, therefore, to be closely related to the contemporaneous European fauna.

The molluscan fossils do not afford definite evidence of the presence of Cenomanian beds in this district. An oyster found at B.71, B.74 and B.75 closely resembles the well-known Cenomanian species, *Exogyra flabellata* Goldfuss, but it could also be referred either to a Lower Cretaceous or to a Senonian species. At B.75 it was associated with a *Trigonia* of the Scabrae section, too poorly preserved to be worthy of further mention.

In the same district, and separated from the beds yielding the Neocomian fossils by only 150 feet of strata, occurs a sandstone yielding fossils which appear to be of fairly high Senonian age. At the locality Karin Hauratiroh (B.73) specimens of the well-known species *Lopha dichotoma* (Bayle) and *Exogyra overwegi* v. Buch, together with a gastropod referable to *Nerita* (? *Otostoma*), were obtained from this bed. 300 feet higher in the succession at this locality, and also at Galweineh Tug (B.76), occurs a sandstone with the Rudists *Sauvagesia* sp., *Durania* cf. *austinensis* (*Roemer*), and *Hippurites* sp. ; the horizon of these is undoubtedly high in the Senonian. A high Senonian (perhaps Maestrichtian) horizon is also developed in districts lying to the east and south of Heis (localities F.47, A.33, F.61, F.62), where the rock is a dark brown sandstone containing *Exogyra overwegi* v. Buch, *Liostrea incurva* (Nilsson), *Venericardia beaumonti* (d'Archiac and Haime), and *Crassatella* (?) *somaliensis* sp. nov. The last-named

* Krenkel (1926, p. 38) has unfortunately cited the earlier determinations.

species, although apparently abundant in the Somaliland beds, does not appear to be closely related to any form described from elsewhere ; otherwise this Senonian fauna has much in common with the fauna of contemporaneous beds developed in other parts of northern Africa, such as Egypt, Tripoli, and Tunis.

At one locality (φ.56) the Nubian Sandstone yielded some ill-preserved impressions of what appear to be marine gastropods and lamellibranchs, but these are indeterminate.

II. DESCRIPTION OF THE MATERIAL.

Class GASTROPODA.

Family **NERITIDAE.**

Genus **Nerita** Linné, 1758.

? Subgenus **Otostoma** d'Archiac, 1859.

1. **Nerita** (? **Otostoma**) sp. indet. Pl. XXII, fig. 1.

Occurrence and Material.—B.73 ; Senonian ; one specimen.

Description and Remarks.—The apertural side of this specimen appears to have been crushed, possibly owing to internal resorption of the shell, but the upper surface of the shell is fairly well preserved, and bears closely-spaced, depressed, flat-topped riblets, which follow the direction of the growth-stages, but usually divaricate at a short distance from the apex. There is no trace of spiral sculpture, but very little shell remains on the anterior part of the specimen. The spire does not protrude. The diameter of the specimen is 16 mm.

This specimen is closely comparable to the well-known uppermost Cretaceous species *Nerita* (*Otostoma*) " *rugosa* Hoeninghaus " (Goldfuss, 1844, p. 119, pl. cxcix, fig. 11 ; Binckhorst, 1861, p. 41, pl. iii, figs. 15*a–d* ; pl. v*a*, figs. 1*a*, *b*), from Maestricht, and *N.* (*O.*) *divaricata* d'Orbigny (=*pontica* d'Archiac, 1859, p. 874, pl. xix, figs. 2, 3 ; Noetling, 1897, p. 54, pl. xiv, figs. 3, 4 ; Krumbeck, 1906, p. 112, pl. ix, fig. 2), from France, Hungary, Tripoli, India, etc. On account of its comparatively small size and imperfect preservation, I cannot, however, determine whether it is specifically identical with either of these forms.

Class LAMELLIBRANCHIA.

Family **ISOGNOMONIDAE.**

Genus **Isognomon** Solander, 1786.

(=*Perna* auctt., *non* Retzius, 1788.)

2. **Isognomon** cf. **ricordeanum** (d'Orbigny). Pl. XXIII, fig. 4.

References to descriptions of the type-form are :—

1846. *Perna ricordeana* d'Orbigny, p. 494, pl. cccxcix, figs. 1–3.

1905. *Perna ricordeana* Woods, p. 90, text-figs. 16–18.

Occurrence and Material.—B.70 ; Lower Cretaceous ; 2 specimens.

Description and Remarks.—The larger specimen is about 82 mm. in height and 62 mm. in length ; it is somewhat incomplete, but appears to have been subrectangular in shape and not very oblique. The shell has the characteristic prismatic structure of the Isognomonidae, while impressions of ligamental pits are visible along the internal mould of the hinge-margin.

In size and apparently in shape this form agrees well with the Lower Cretaceous species " *Perna* " *ricordeana* d'Orbigny, which does not appear to have been recorded from Africa previously.

Family **OSTREIDAE.**

Genus **Ostrea** Linné, 1758.

Subgenus **Liostrea** Douvillé, 1904.

3. **Ostrea (Liostrea) incurva** Nilsson. Pl. XXII, figs. 2*a*, *b*, 3.

1827. *Ostrea incurva* Nilsson, p. 30, pl. vii, figs. 6*a*, *b*.
1827. *O. curvirostris* Nilsson, p. 30, pl. vi, figs. 5*a*, *b*.
1827. *O. acutirostris* Nilsson, p. 31, pl. vi, figs. 6*a*, *b*.
1869. *O. curvirostris* Coquand, p. 67, pl. xxxv, figs. 16–22.
1869. *O. acutirostris* Coquand, p. 75, pl. xxxv, figs. 8–15 ; pl. xxxvi, figs. 1–5.
1897. *O. acutirostris* Noetling, p. 37, pl. ix, figs. 1, 9.
1902. *O. acutirostris* Quaas, p. 184, pl. xxi, fig. 11.
1913. *O. incurva* Woods, p. 388, pl. lviii, figs. 10–13 ; pl. lix.

Occurrences and Material.—A.33, 15 specimens ; F.62, 5 specimens. Horizon Senonian.

Remarks.—As in other localities, the specimens referred to this species show considerable variation. Some are narrow and pronouncedly lunate, while others are wider, ovate, and subequilateral. The lower valve is usually fairly gibbose, the upper valve flat or slightly convex.

Genus **Lopha** Bolten, 1798.

4. **Lopha dichotoma** (Bayle). Pl. XXII, fig. 4.

1849. *Ostrea dichotoma* Bayle, in Fournel, p. 365, pl. xviii, figs. 17, 18.
1904. *Lopha dichotoma* Douvillé, p. 274, pls. xxxvii–xxxviii.
1912. *Alectryonia dichotoma* Pervinquière, p. 206, pl. xiv, figs. 19–21.
1923. *Alectryonia dichotoma* Parona, p. 34, pl. xi, figs. 1, 2.

Occurrence and Material.—B.73 ; Senonian ; 2 specimens.

Remarks.—These are typical specimens of this well-known species. The larger one retains traces of its original violet colour-ornamentation.

Genus **Exogyra** Say, 1820.

5. **Exogyra** cf. **latissima** (Lamarck). Pl. XXII, figs. 5, 6.

References to descriptions of the type-form are :—

1801. *Gryphaea latissima* Lamarck, p. 399.
1821. *Gryphaea couloni* Defrance, vol. xix, p. 534.
1822. *Gryphaea sinuata* J. Sowerby, p. 43, pl. cccxxxvi.
1869. *Ostrea couloni* Coquand, p. 180, pl. lxv, fig. 10 ; pl. lxxi, figs. 8–10 ; pl. lxxiv, figs. 1–5 ; pl. lxxv, figs. 1–6, 22.
1912. *Exogyra latissima* Pervinquière, p. 176.

Occurrences and Material.—B.78, 4 specimens ; B.79, 2 specimens. Horizon Lower Cretaceous.

Remarks.—These are small specimens of a smooth *Exogyra*, which is probably referable to this widespread Lower Cretaceous species. The Somaliland specimens figured as *E. couloni* by Dacqué (1904, p. 14, pl. ii, figs. 6–8) have pronounced ribbing and appear to be intermediate between *E. latissima* and *E. boussingaultii* d'Orbigny.

6. **Exogyra** sp. Pl. XXII, figs. 8, 9.

Occurrences and Material.—B.71, 3 specimens ; B.74, one specimen ; B.75, one specimen.

Remarks.—These specimens, which include both left and right valves, are indistinguishable from the well-known Cenomanian species *Exogyra flabellata* Goldfuss. In the absence, however, of information as to the stratigraphical position of the beds from which they were obtained

relative to the beds in the same district yielding Lower Cretaceous and Senonian mollusca, it seems undesirable definitely to refer them to that species. Some specimens of the Lower Cretaceous species *E. boussingaultii* d'Orbigny (*E. minos* Coquand), on the one hand, and of the Upper Senonian species *E. matheroniana* (d'Orbigny), on the other hand, are scarcely distinguishable from *E. flabellata*.

7. **Exogyra overwegi** v. Buch. Pl. XXII, figs. 7*a*, *b*.

1852. *Exogyra overwegi* v. Buch, in Beyrich, p. 161, pl. i, figs. 1, 2.
1869. *Ostrea fourneti* Coquand, p. 26, pl. iii ; pl. xiii, fig. 1.
1902. *Exogyra overwegi* Quaas, p. 190, pl. xxii, figs. 3–10.
1912. *Exogyra overwegi* Pervinquière, p. 183, pl. xiii, figs. 10–12.
1913. *Exogyra overwegi* de Stefani, p. 272, pl. xxiv, figs. 8–10 ; pl. xxv, figs. 1, 2.
1923. *Exogyra overwegi* Parona, p. 30, pl. viii, figs. 1–7 ; pl. ix, figs. 1, 2.

Occurrences and Material.—A.33, 14 specimens (small) ; B.73, one specimen ; F.47, 16 specimens ; F. 62, 11 specimens. Horizon Senonian.

Remarks.—These are typical specimens of this well-known species.

Family **PECTINIDAE.**

Genus **Neithea** Drouet, 1824.

8. **Neithea** sp.

Occurrence and Material.—B.78 ; Lower Cretaceous ; one specimen.

Remarks.—This specimen, which is much obscured by matrix, is about 24 mm. in height, and appears to agree in shape with the Lower Cretaceous species *Neithea morrisi* (Pictet and Renevier). Only two secondary ribs occur in the interspaces between adjacent primary ones.

Family **CARDITIDAE.**

Genus **Venericardia** Lamarck, 1801.

9. **Venericardia beaumonti** (d'Archiac and Haime). Pl. XXII, fig. 10.

1854. *Cardita beaumonti* d'Archiac and Haime, p. 253, pl. xxi, figs. 14, 14*a*, *b*.
1902. *Cardita libyca* Quaas, p. 203, pl. xxiii, figs. 13–21 ; pl. xxxii, figs. 3–6.
1912. *Cardita beaumonti* Pervinquière, p. 242, pl. xviii, figs. 4–22.
1913. *Cardita beaumonti* de Stefani, p. 282, pl. xxvi, figs. 11–19.
1923. *Cardita beaumonti* Parona, p. 40, pl. ix, figs. 9, 10.

Occurrence and Material.—F.47 ; Senonian ; 4 specimens.

Remarks.—Although these specimens are somewhat eroded, I have no hesitation in referring them to this well-known uppermost Cretaceous species. Its synonymy has been fully discussed by Pervinquière (loc. cit.).

Family **CRASSATELLIDAE.**

Genus **Crassatella** Lamarck, 1799.

10. **Crassatella** (?) **somaliensis** sp. nov. Pl. XXIII, figs. 6*a*, *b*, *c*.

Diagnosis.—Thick-shelled, rather variable in shape, trigonally ovate, inequilateral, obliquely truncated posteriorly, fairly gibbose, most inflated anterior to the umbones. Umbones moderately prominent, somewhat separated, usually placed at about the anterior third of the length ; posterior slope with a more or less distinct keel. Surface with pronounced and sometimes very irregular concentric corrugations ; in front of the umbones a cordate area, which is not impressed, is circumscribed by a definite furrow in each valve.

Dimensions.—Holotype : length 54·5 mm., height 50·0 mm., inflation 45·5 mm.

Occurrences and Material.—F.47, one specimen ; F.61, the holotype (L.53583) ; F.62, 2 specimens. Horizon Senonian.

DESCRIPTION AND REMARKS.—The specimens are preserved in a hard sandstone matrix, which it has not been possible to remove from the hinge-region of those which are isolated valves. Sections following the plane of junction of the two valves have, however, been cut through two of the bivalve specimens, including the holotype, and pass through a complicated series of hinge teeth, set on thick hinge-plates which, in the holotype, reach one-third of the way from the umbo to the ventral margin. In that specimen, three narrow and very elongate, interlocking cardinal teeth are visible below the umbones ; two of these appear to belong to the right valve, and one to the left. Behind them, a large posterior cardinal with a corrugated face appears to belong to the left valve. A big anterior lateral tooth apparently belonging to the right valve, and with a very jagged top, fits into a recess below the hinge-plate of the left valve. The ligament may have been internal. In the other specimen sectioned, the hinge-plate is somewhat smaller, but the narrow cardinal teeth below the umbones are well shown ; the shape of the anterior lateral tooth has been obscured by secondary crystallisation.

I am uncertain as to what genus, or even family, this peculiar species should be referred. Most probably it belongs to a new genus which cannot, however, be diagnosed from the material at present available. The hinge-structure is much more complicated than in *Crassatella*, to which the species has been provisionally assigned.

Family **RADIOLITIDAE.**

Genus **Sauvagesia** Bayle, in Fischer, 1887.

11. **Sauvagesia** sp. Pl. XXIII, figs. 1*a*, *b*, 2*a*, *b*.

OCCURRENCE AND MATERIAL.—B.76 ; Senonian ; 3 incomplete lower valves, one with a part of the upper valve adhering, but much crushed.

DESCRIPTION AND REMARKS.—The lower valve is depressed-conical in shape, its diameter increasing rapidly during growth. The largest specimen, which originally does not appear to have exceeded 35 mm. in height, attains a diameter of 62 mm. Its body-cavity has a maximum diameter of 37 mm., so that the shell-wall is comparatively thick. The exterior is ornamented with numerous weak, unequal longitudinal riblets, crossed by fine, wavy lines of growth. The siphonal bands are not clearly visible, but appear normally to have been almost flush with the remainder of the surface ; in one specimen, however, some accident in growth has produced two narrow, conspicuous bulges of the surface at one place on the side opposite the ligamental ridge. The lip, which shows a reticulate pattern, representing the cross-sections of the longitudinal prisms of which the shell-wall is composed, has a series of low, rounded, unequal crenulations extending rather more than half-way across from the exterior. Cross-sections reveal the presence of a short, narrow ligamental ridge.

The depressed shape of this species is comparable to that of *S. praesharpei* Toucas (1909, p. 87, pl. xvii, fig. 4), but its exterior lacks the strong longitudinal ribs of that form. It is probably a new species.

Genus **Durania** Douvillé, 1908.

12. **Durania** cf. **austinensis** (Roemer).

References to descriptions of the type-form are :—

1852. *Radiolites austinensis* Roemer, p. 77, pl. vi, figs. 1*a–d*.
1904. *Biradiolites austinensis* Douvillé, p. 257, pl. xxxix, fig. 2.
1912. *Durania austinensis* Parona, p. 287, pl. ii, fig. 4.
1932. *Durania austinensis* Kühn, p. 102 (full synonymy).

OCCURRENCE AND MATERIAL.—B.76 ; Senonian ; one incomplete specimen.

DESCRIPTION AND REMARKS.—When complete, this specimen seems to have been about 140 mm. in diameter. The lip, which is 50 mm. thick, bears the series of bi- or tri-furcating radial grooves characteristic of *D. austinensis*. The polygonal network is rather finer than in specimens from the English Senonian, but comparable to that of the specimens figured by Parona (loc. cit.) ; the polygons show a slight tendency to radial elongation. The exterior is ill-preserved, and the ornamentation and siphonal bands not visible.

Family **HIPPURITIDAE.**

Genus **Hippurites** Lamarck, 1801.

13. **Hippurites** sp. indet. Pl. XXIII, fig. 3.

OCCURRENCE AND MATERIAL.—B.73 ; Senonian ; one fragment.

DESCRIPTION AND REMARKS.—This specimen is a somewhat crushed fragment of a small lower valve, about 27 mm. in diameter ; the external ornamentation is not preserved. There is no cardinal ridge ; the first pillar is short and almost semicircular in cross-section, the second pillar thinner and more elongate, but not pediculate. In cross-section, this form does not agree exactly with any of the species illustrated in Toucas' monograph of the Hippuritidae (1903–4), and, in view of its incompleteness, it must be considered indeterminate.

Family **PHOLADOMYACIDAE.**

Genus **Pholadomya** G. B. Sowerby, 1823.

14. **Pholadomya alternans** Roemer. Pl. XXIII, fig. 5.

1841. *Pholadomya alternans* Roemer, p. 76.
1884. *P. alternans* Weerth, p. 34, pl. viii, fig. 1 ; pl. ix, fig. 11.
1900. *P. alternans* Wollemann, p. 134, pl. v, figs. 9, 10 ; pl. vi, fig. 3.

OCCURRENCE AND MATERIAL.—B.70 ; Lower Cretaceous ; one specimen.

DESCRIPTION AND REMARKS.—An ovate *Pholadomya*, 48 mm. in length and 36 mm. in height, ornamented with about 12 subequal, but unevenly spaced, radial ribs, which are absent from the postero-dorsal and extreme anterior regions. It agrees well with the figures of *P. alternans* given by Wollemann. In *P. trigeriana* Cotteau (see Moesch, 1875, p. 89, pl. xxxi, fig. 1 ; pl. xxxiii, fig. 1) the umbones are more prominent and the radial ribs fewer.

III. LIST OF WORKS TO WHICH REFERENCE IS MADE.

d'Archiac, A., 1859. Note sur le genre *Otostoma*. *Bull. Soc. Géol. France*, ser. 2, xvi, pp. 871–9, pl. xix. Paris.

d'Archiac, A., and J. Haime, 1854. Description des animaux fossiles du Groupe Nummulitique de l'Inde, Livr. 2. Paris.

Bayle, E., 1849. Sur quelques fossiles de la province de Constantine. In H. Fournel, Richesse minérale de l'Algérie, pp. 359–379, pls. xvii, xviii. Paris.

Beyrich, E., 1852. Bericht über die von Overweg auf der Reise von Tripoli nach Murzuk und von Murzuk nach Ghat gefundenen Versteinerungen. *Monatsber. Verh. Ges. Erdkunde Berlin*, n.s., ix, pp. 154–168, pls. i–iii.

Binkhorst, J. T. B. v. d., 1861. Monographie des Gastéropodes et des Céphalopodes de la Craie supérieure du Limbourg. Bruxelles.

Brown, C. Barrington, 1931. The Geology of North-Eastern British Somaliland. *Quart. Journ. Geol. Soc.*, lxxxvii, pp. 259–280. London.

Coquand, H., 1869. Monographie du genre *Ostrea*. Terrain crétacé. Marseille.

Dacqué, E., 1904. Beiträge zur Geologie des Somalilandes. I Teil : Untere Kreide. *Beitr. Palaeont. Österr.-Ungarns*, xvii, pp. 7–20, pls. ii, iii. Wien.

Defrance, M. J. L., 1821. Article " Gryphée." *Dict. Sci. Nat.*, xix, pp. 533–8. Paris.

Douvillé, H., 1904. Paléontologie, Mollusques fossiles. In J. de Morgan, Mission scientifique en Perse, iii (4). Paris.

Goldfuss, A., 1844. Petrefacta Germaniae, iii. Düsseldorf.

Gregory, J. W., 1900. On the Geology and Fossil Corals and Echinids of Somaliland. *Quart. Journ. Geol. Soc.*, lvi, pp. 26–45, pls. i, ii. London.

Krenkel, E., 1926. Abessomalien. Handbuch der Regionalen Geologie, vii (8). Heidelberg.

Krumbeck, L., 1906. Beiträge zur Geologie und Palaeontologie von Tripolis. *Palaeontographica*, liii, pp. 51–136, pls. vii–ix. Stuttgart.

Kühn, O., 1932. Rudistae. Fossilium Catalogus. I : Animalia, Pars 54. Berlin.

Lamarck, J. B., 1801. Systême des animaux sans vertèbres. Paris.

Moesch, C., 1874–5. Monographie der Pholadomyen. *Mém. Soc. Pal. Suisse*, i and ii. Bâle & Genève.

Newton, R. B., 1905. The Tertiary Fossils of Somaliland, as represented in the British Museum (Natural History). *Quart. Journ. Geol. Soc.*, lxi, pp. 155–180, pls. xvii–xxi. London.

Nilsson, S., 1827. Petreficata Suecana. Formationis Cretaceae. Lund.

Noetling, F., 1897. Fauna of the Upper Cretaceous (Maestrichtian) Beds of the Mari Hills. *Palaeont. Indica*, ser. xvi, i (3). Calcutta.

d'Orbigny, A., 1844–8. Paléontologie Française. Terrains Crétacés, iii. Paris.

Parona, C. F., 1912. Nuovi studii sulle Rudiste dell' Appennino (Radiolitidi). *Mem. R. Accad. Sci. Torino*, ser. 2, lxii, pp. 273–292, pls. i, ii.

Parona, C. F., 1923. Fauna del Neocretacico della Tripolitania. Molluschi. Parte ii—Lamellibranchi. *Mem. Descr. Carta Geol. Ital.*, viii (4). Roma.

Pervinquière, L., 1912. Études de Paléontologie Tunisienne. II. Gastropodes et Lamellibranches des terrains crétacés. *Carte Géol. Tunisie*. Paris.

Quaas, A., 1902. Die Fauna der Overwegischichten und der Blätterthone in den libyschen Wüste. *Palaeontographica*, xxx (2), pp. 153–338, pls. xx–xxxiii. Stuttgart.

Roemer, F. A., 1840–1. Die Versteinerungen des Norddeutschen Kreidegebirges. Hanover.

Roemer, F. A., 1852. Die Kreidebildungen von Texas und ihre organischen Einschlüsse. Bonn.

Sowerby, J., 1821–3. The Mineral Conchology of Great Britain, iv. London.

Stefani, C. de, 1913. Fossili della Creta superiore raccolti da Michele Sforza in Tripolitania. *Palaeont. Italica*, xix, pp. 255–299, pls. xxiii–xxvii. Pisa.

Toucas, A., 1903–4. Études sur la classification et l'évolution des Hippurites. *Mém. Soc. Géol. France* (Pal.), No. 30. Paris.

Toucas, A., 1907–9. Études sur la classification et l'évolution des Radiolitidés. *Ibid.*, No. 36.

Weerth, O., 1884. Die Fauna des Neocomsandsteins im Teutoburger Walde. *Geol. Pal. Abhandl.*, ii (1). Berlin.

Wollemann, A., 1900. Die Bivalven und Gastropoden des deutschen und holländischen Neocoms. *Abhandl. Preuss. Geol. Landesanst.*, n.s., 31. Berlin.

Woods, H., 1899–1913. A Monograph of the Cretaceous Lamellibranchia of England. *Palaeont. Soc.* London.

1

2a

2b

4

3

7a

7b

5

6

8

9

10

PLATE XXII.

CRETACEOUS GASTROPOD AND LAMELLIBRANCHIA.

(*Photographs by* L. R. Cox. *All figures are of natural size unless otherwise stated.*)

Fig. 1. *Nerita* (*Otostoma* ?) sp., × 1¾. B.73, Karin Hauratiroh ; Senonian. Brit. Mus., G.55766, Barrington Brown Coll. (P. 199.)

Figs. 2*a*, *b*, 3. *Ostrea* (*Liostrea*) *incurva* Nilsson. F.62, Mukroh Well, south of Heis ; Senonian. Brit. Mus., L.53599–600, Farquharson Coll. (P. 200.)

Fig. 4. *Lopha dichotoma* (Bayle), slightly reduced. B.73, Karin Hauratiroh ; Senonian. Sedgwick Mus., F.1091, Barrington Brown Coll. (P. 200.)

Figs. 5, 6. *Exogyra* cf. *latissima* (Lamarck). B.78, near Madashon ; Lower Cretaceous. Brit. Mus., L.61224–5, Barrington Brown Coll. (P. 200.)

,, 7*a*, *b*. *Exogyra overwegi* v. Buch. F.47, Masha Aked ; Senonian. Brit. Mus., L.53677, Farquharson Coll. (P. 201.)

Fig. 8. *Exogyra* sp. B.74, near Madashon ; horizon uncertain. Brit. Mus., L.61226, Barrington Brown, Coll. (P. 200.)

,, 9. *Exogyra* sp. B.75, near Madashon ; horizon uncertain. Brit. Mus., L.61227, Barrington Brown Coll. (P. 200.)

,, 10. *Venericardia beaumonti* (d'Archiac & Haime). F.47, Masha Aked ; Senonian. Brit. Mus., L.53684, Farquharson Coll. (P. 201.)

PLATE XXIII.

CRETACEOUS LAMELLIBRANCHIA.

(*Photographs by* L. R. Cox. *All figures are of natural size.*)

Figs. 1*a*, *b*. *Sauvagesia* sp. ; (*a*) transverse section, showing short ligamental ridge, (*b*) exterior, showing depressed shape. B.76, near El Dibr, Galweineh Tug ; Senonian. Brit. Mus., L.61230, Barrington Brown Coll. (P. 202.)

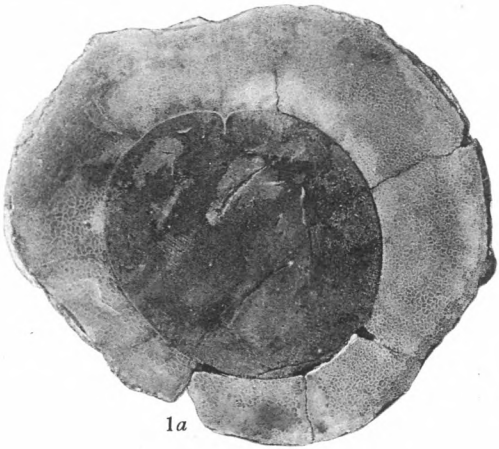
,, 2*a*, *b*. *Sauvagesia* sp. ; (*a*) external sculpture, (*b*) showing transverse undulations of lip. Same locality and horizon. Brit. Mus., L.61229, Barrington Brown Coll. (P. 202.)

Fig. 3. *Hippurites* sp. ; transverse section (the conspicuous indentation is due to an accidental fracture). B.73, Karin Hauratiroh ; Senonian. Brit. Mus., L.61231, Barrington Brown Coll. (P. 203.)

,, 4. *Isognomon* cf. *ricordeanum* (d'Orbigny). B.70, near Madashon ; Lower Cretaceous. Brit. Mus., L.61736, Barrington Brown Coll. (P. 199.)

,, 5. *Pholadomya alternans* Roemer. B.70, near Madashon ; Lower Cretaceous. Sedgwick Mus., F.1092, Barrington Brown Coll. (P. 203.)

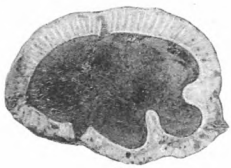
Figs. 6*a*, *b*, *c*. *Crassatella* (?) *somaliensis* sp. nov. ; (*a*) section along plane of valve margins, passing through the hinge-teeth, (*b*) lateral view, (*c*) dorsal view. F.61, between Mukroh and the Lashida Pass to Dagah Hor ; Senonian. Brit. Mus., L.53583, Farquharson Coll. (P. 201.)



1*a*

4

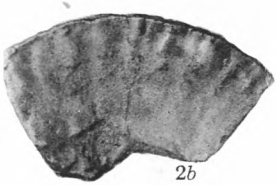
1*b*



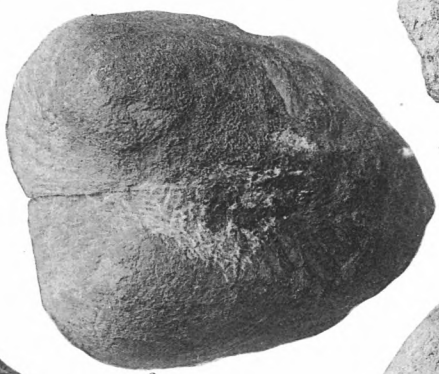
3

2*a*

5

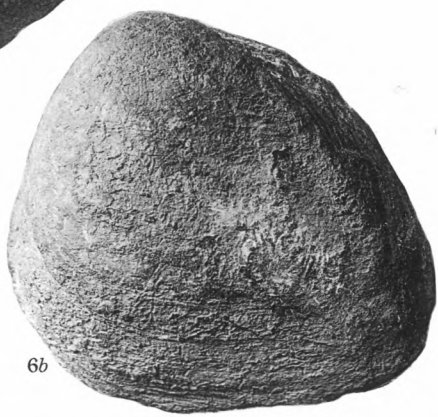


2*b*



6*c*

6*a*



6*b*