

after treatment with a bar-magnet, a grain or two of brown tourmaline was also found. The specific gravity of both specimens is 2.63, the same figure as that for the granophyre.

Mr. Hemingway states that the rock is very similar to the white felsite interbedded in the Drygill shales to the north of Brandy Gill.

GEOLOGICAL AGE.

It may be of interest to draw attention here to the recent work of Mr. J. F. N. Green on the age of the Carrock Fell complex.¹ It is well known that the complex is of later date than the Borrowdale volcanic series. An upper limit is fixed by Mr. Green's discovery of granophyre fragments in the Watch Hill Beds. These consist of shales and polygenetic grits which form a series of patches lying at various horizons on the Skiddaw Slates between Cockermouth (Watch Hill) and Great Sca Fell.² Only one pebble of granophyre was found at Watch Hill, but in the eastern exposures (i.e. in those near to Carrock Fell) the rock was found to be invariably present in the coarser bands of the series. Mr. Green shows that the Watch Hill Beds are younger than the Borrowdale Series and older than the Devonian earth-movements, and for these and other reasons he correlates them with the Conistone Limestone Series. Consequently he considers the igneous rocks of Carrock Fell to be pre-Bala. Mr. Green concludes: "The Borrowdale Series is ascribed to the Middle Llanvirn . . . The Eskdale granite, Buttermere granophyre, St. John's granite-porphry, and Carrick Fell complex all belong to the suite, being intruded before the solfataric stage, but at a late period of the episode."

V.—THE FOSSILS OF THE EAST ANGLIAN SUB-CRAG BOXSTONES.

By ALFRED BELL.

IN the opening article of the *GEOLOGICAL MAGAZINE* (Vol. I, p. 5, 1864) Mr. J. W. Salter remarks: "An obscure but novel group of organic remains comes to light in some well-worked district for which we have as yet no fixed geological place," and this description may well apply to the fauna dealt with in the following pages.

Usually considered by geological writers as being derived from sources outside the East Anglian area, very little attention has been paid to it, its environment, or to its Continental affinities. The fossils hereafter referred to occur in a sandstone matrix³ more or less consolidated, the relics of a former stratum afterwards broken up, and now found distributed in places beneath the overlying Pliocene deposits, between Walton-on-the-Naze and Hollesley on the coast and inland to about Ipswich.

¹ "The Age of the Chief Intrusions of the Lake District": *Proc. Geol. Assoc.*, xxviii, pp. 17-25, 1917.

² *Ibid.*, plate ii.

³ An interesting and important paper dealing with the petrology of the Suffolk "Boxstones" (Crag), by Dr. P. G. H. Boswell, D.I.C., F.G.S. (now Professor of Geology in the University of Liverpool), appeared in the *GEOLOGICAL MAGAZINE* for June, 1915 (pp. 250-9, Plate X, and Figs. 1-3) and may be consulted with advantage by readers of the present paper.

Within these boundaries the bed-rock is a floor of London Clay, formerly covered by a higher zone of the same material, replete with a fauna of similar type to that found at Sheppey, including fishes and Crustaceans in fine preservation, the broken-up clay and the fossils being deeply phosphatized. Upon this, again, there seems to have been deposited a bed of sand of which the actual presence can only be inferred, since it has not been found in situ as a separate stratigraphical unit or stratum; but the suggestion is warranted by the mass of debris yielding a particular group of fossils found in the irregular blocks of indurated sandstone or loosely distributed in the adjacent Crag sands, and in the tabular pieces present at Trimley, Bucklesham, and other places, of which Dr. J. E. Taylor writes in *White's History of Suffolk*, 1874, "that it is not uncommon to find slabs of the same kind of sandstone which appear to have undergone little abrasion and to be in nearly the same condition they were in when the formation to which they originally belonged was broken up." Similar pieces of sandstone with sharply defined impressions of the fossils and shells, more or less unworn, may be obtained occasionally during low tides at Bawdsey, where a bed of the nodules may be seen at times near the Haven.

The petrology of the "boxstones" has been fully described by Dr. Boswell, F.G.S.,¹ and the general features of the detritus by myself.²

In the discussion following the reading of Professor Lankester's paper³ "On the Newer Tertiaries of Suffolk and their Fauna", Sir C. Lyell pronounced the boxstones then produced as being similar to those he had seen at Berchem, near Antwerp, in 1851,⁴ in a deposit of Rupelian age, the shells corresponding to those figured by de Koninck in his well-known memoir⁵ on the fossil shells of Basele, Boom, etc.

This particular horizon has been referred by M. van den Broeck⁶ to the uppermost stage of the Middle Oligocene; a system largely developed, according to von Koenen, Ravn, and other writers, in Denmark, Belgium, and North-West Germany; with a few exceptions the boxstone species agree with those found in one or other of these localities.

The English literature bearing upon the deposit and the faunas associated with it before 1865 is very scanty. Charlesworth, in 1837, figured a tooth of *Carcharias megalodon*, with sundry notes on the phosphatic nodules; and the so-called "Coprolites" and mammalia recorded between then and 1851 are mentioned in the bibliography appended to C. Reid's *Pliocene Deposits of Great Britain* (1890). The earliest descriptive account⁷ is that given by the Rev. W. B.

¹ "Petrology of the Suffolk Boxstones": op. cit.

² "Sub-Crag Detritus": Proc. Prehistoric Soc. East Anglia, 1915, vol. xi, pp. 139-48.

³ Quart. Journ. Geol. Soc., vol. xxvi, pp. 493-513, 1870.

⁴ Quart. Journ. Geol. Soc., vol. viii, p. 282, 1852.

⁵ Mém. Acad. R. Sci. Bruxelles. vol. xi, 1837.

⁶ Bull. Soc. Belge Géol., vol. vii, p. 299, 1893.

⁷ Ann. Nat. Hist. (2), vol. viii, pp. 206-11, 1851.

Clarke, of Ipswich, on the nodule "bed" and its contents, figuring amongst other items a ziphioid rostrum. This was apparently reproduced with other species in an early paper on Red Crag Mammals,¹ by Professor Owen.

Mr. S. V. Wood was the first to recognize the shells in the boxstones,² specifying several of these by name, but nothing further was done till Professor Sir Ray Lankester, in 1865, briefly noticed the deposit and, in 1868,³ discussed at some length its possible origin and that of its contents.

Unfortunately for science, the closing of the "Coprolite" industry or phosphate diggings, and the little interest taken in the stones when they were obtainable, limits the scope of our inquiry, and all that can be done is to utilize the material at hand. This is chiefly conserved in the Museums of Practical Geology, London, Ipswich, Norwich, and York, and in one or two private collections, all of which, by the courtesy of those in charge of them, it has been my privilege critically to examine. I have also to thank the Trustees of the Percy Sladen Memorial Fund for assistance in collecting information.

The specimens upon which the following lists are founded commonly occur as moulds of the exterior of the shells, showing the sculpture, or as casts of the interior; the shelly matter being rarely preserved. From these it has been possible by the use of wax or gutta-percha to reproduce the general details of the organism, which has been done by permission, from a number of the rarer and more perfect examples, especially those in the York and Norwich Museums. These will be ultimately added to those specimens already preserved in the Museum of Practical Geology, London.

The fossils are so scattered that it may be useful to students to know the Museums where they can be seen, and to have a reference to some good figure of the shell referred to in the text. As a rule the organisms have suffered little attrition, the sculptural details are well preserved, and most of the bivalves are found closed, as if embedded alive before the muscles had become relaxed.

Boxstone Mollusca.

Cylichna sp.

Cylichna cylindracea, Ravn, K. Danske Vid. Selsk. Skrift. (7), vol. iii, p. 367, pl. viii, fig. 15, 1907. Mus. Pract. Geol. London, York.

Ringicula auriculata, Menard.

Ringicula auriculata. Beyrich, Zeitsch. deutsch. Geol. Ges., vol. v, p. 330, pl. v, fig. 13, 1853. Mus. Pract. Geol. London.

Ringicula striata, Philippi.

Ringicula striata, Philippi, Beit. tert. N.W. Deutschl., p. 28, pl. iv, fig. 23, 1843.

„ „ Ravn, K. Danske Vid. Selsk. Skrift. (7), vol. iii, p. 365, pl. viii, fig. 11, 1907.

Mus. Pract. Geol. London.

¹ Quart. Journ. Geol. Soc., vol. xii, 1856.

² Crag Moll., pt. ii, 1851.

³ GEOL. MAG., Vol. II, pp. 103-49, 1865; Vol. V, p. 254, 1868.

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Conus Dujardini, Deshayes.

Conus Dujardini, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 40, pl. v, figs. 3-8, 1856.

„ „ Lankester, Quart. Journ. Geol. Soc., vol. xxvi, p. 502, pl. xxxiv, fig. 5, 1870.

Mus. Ipswich, Norwich.

Conus antediluvianus, var. B, Grateloup.

Conus antediluvianus, var. B, Grateloup, Atlas Conch. foss. de l'Adour, No. 44, fig. 6, 1840. Mus. Ipswich, York.

Conus cf. ventricosus, Bronn.

Conus ventricosus, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 32, pl. iii, figs. 5-6, 1856.

„ „ Fontannes, Moll. plioc. Vall. du Rhone, vol. i, p. 144, pl. viii, fig. 11, 1887.

Mus. Ipswich.

Pseudotoma Morreni, de Koninck.

Pleurotoma Morreni (de Koninck), Coq. foss. Basele, 1837, p. 21, pl. i, fig. 3. Mus. Ipswich.

[Mr. F. W. Harmer (Plioc. Moll. Gt. Brit., pt. ii, p. 212, regards this shell as a variety of *Pl. intorta*, Brocchi, with which it has many points of resemblance.)]

Pleurotoma Steinworthi, Semper.

Pleurotoma Steinworthi, von Koenen, Mioc. nord-Deutschl., p. 94, pl. ii, fig. 10, 1872.

„ „ Norregaard, Dansk. Geol. Foren., vol. v, p. 133, pl. iii, fig. 10, 1916.

Cancellaria (Trigonostoma) cf. ampullacea (Brocchi).

Voluta ampullacea, Brocchi, Conch. foss. Sub-ap., vol. ii, p. 313, pl. iii, fig. 9. *Trigonostoma ampullacea*, Sacco, Moll. Tert. terz. Piem., pt. xvi, p. 9, pl. i, figs. 16-20.

[Some imperfect forms at Ipswich may belong to *C. umbilicaris*, Brocchi, but as the aperture is not seen in either species, both ascriptions may need revision.]

Cancellaria (Ventrilia) aperta (Beyrich).

Cancellaria aperta, Beyrich, Zeitsch. deutsch. Geol. Ges., vol. viii, p. 586, pl. xix, fig. 5, 1856. Mus. York.

Ancilla Nysti, F. W. Harmer.

Ancilla Nysti, F. W. Harmer, Plioc. Moll. Gt. Brit., pt. i, p. 52, pl. xii, figs. 32-3, 1913. Harmer Coll.

Voluta (Pyrgomitra) fusus (Philippi).

Fasciolaria fusus, Philippi, Beit. N.W. deutsch. tert., p. 25, pl. iv, fig. 14, 1843.

Voluta parca, Beyrich, Zeitsch. deutsch. Geol. Ges., vol. v, p. 357, pl. viii, fig. 1, 1853. Mus. York, Ipswich.

[These figures represent the younger and older states of the shell. It has a longer and narrower canal than the typical *V. Lamberti* of the Anglo-Belgian Crag basin. Dr. Mörch, in the Journ. de Conch., vol. xvii, p. 428, 1869, assigns this group to the sub-genus *Pyrgomitra*.]

Voluta (Pyrgomitra) sp.

Voluta cf. tarbelliana, var. *ventricosa*, Grateloup, Atlas Conch. foss. l'Adour, pl. xxxix, fig. 2, 1840.

Voluta auris-leporis, Lankester, Quart. Journ. Geol. Soc., vol. xxvi, p. 502, pl. xxxiv, fig. 6, 1870.

Mus. Ipswich.

Mitra cf. *fusiformis*, Brocchi.

Mitra fusiformis, Cerulli-Irelli, Pal. ital., vol. xvii, p. 235, pl. xxi, fig. 19, 1911. Mus. Pract. Geol., London.

[The reference is founded on the cast of a long body and next whorl, 60 mm. long, 25 mm. broad, with a nearly straight figure. *Mitra Venayessina*, Fontannes, Moll. Plioc. Vall. du Rhone, vol. i, p. 79, pl. vi, fig. 1, is closely allied to it.]

Sipho gregarius (Philippi), pars.

Fusus gregarius, Beyrich, Zeitsch. deutsch. Geol. Ges., vol. viii, p. 59, pl. v, figs. 7-8, 1856. Mus. Norwich, Ipswich.

Sipho lineatus (de Koninck).

Fusus lineatus, de Koninck, Coq. foss. Basele, p. 18, pl. iii, figs. 1, 2, 1837. Mus. Pract. Geol. London, Ipswich, York.

Sipho multisulcatus (Nyst).

Fusus multisulcatus, Nyst, Coq. foss. Belge, p. 494, pl. xl, fig. 1, 1843. Mus. Pract. Geol. London.

[Nyst altered de Koninck's specific name *lineatus* to *multisulcatus*, but his figure is not the same as de Koninck's, which shows a shell having a longer spire and canal, and narrower in proportion. They may be varieties of a polymorphous form, but as both varieties occur in the boxstones they are given accordingly for what they are worth.]

Sipho major, A. Bell.

Sipho major, A. Bell, Journ. Ipswich Field Club, vol. iii, p. 9, 1911.

Fusus erraticus, var., Harder, Danm. Geol. Underseg., vol. ii, p. 83, pl. vi, fig. 31, 1913.

Mus. Ipswich.

[This is a large shell, the three lower whorls measuring 80 mm. in length with a breadth of 35 mm. This and the next species may perhaps represent a new group, intermediate between *Sipho* and *Fasciolaria*, as the moulds of the upper whorls show traces of costal ornament. Of this group *Fusus* (aff.) *Konincki*, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, pl. v, fig. 10, might be taken as the type.]

Sipho Ravnii, sp. nov.

Fusus erraticus, var., Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 333, pl. vi, fig. 13, 1907. Mus. Pract. Geol. London, Norwich.

Fasciolaria (*Surculofusus*) *erraticus* (de Koninck).

Fusus erraticus, de Koninck, Coq. foss. Basele, p. 19, pl. ii, fig. 5, 1837.

„ „ Nyst, Coq. foss. Belge, p. 496, pl. xl, fig. 2, 1843.
Mus. Pract. Geol. London, Ipswich.

Liomesus nudum (S. V. Wood).

Buccinum nudum, S. V. Wood, Mon. Crag Moll., Suppl. 2, p. 1, pl. i, fig. 1, 1879.

Liomesus ventrosus (Beyrich).

Fusus ventrosus, Beyrich, Zeitsch. deutsch. Geol. Ges., vol. viii, p. 35, pl. ii, figs. 3-5, 1856.

Buccinopsis Dalei, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 313, pl. v, fig. 1, 1907.

Moore and Stanley Coll.

[Many of the shells found in the Scaldisien beds in Belgium figured as *B. Dalei*, Sow., are much nearer to this species than to those in the English Crag. Fig. 4 in Beyrich's plate is an almost exact delineation of some of the Belgian forms.]

Liomesus cf. danicus (von Koenen).

Buccinopsis danicus, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 313, pl. iv, figs. 10-11, 1886. Mus. Pract. Geol., London.

[The shells figured by Ravn are both imperfect, and the London specimen is referred to it with some doubt as only the dorsal aspect is exposed. It is a rare shell on the Continent, as it is only recorded from the Danish Oligocenes.]

Cominella conica, sp. nov.

A smooth elongate bucciniform shell, channelled at the upper part of the volutions. Whorls 5-6, rounded and sub-carinated. Apex blunt. Aperture semilunate. Outer lip thickened, base but slightly prolonged. Umbilicus exposed by the loss of shelly matter. Height 35 mm., breadth 20 mm. Mus. Ipswich, Cambridge.

Desmoulea conglobata (Brocchi).

Buccinum conglobatum, Brocchi, Conch. foss. Subap., vol. i, p. 334, pl. iv, fig. 15, 1814.

Nassa conglobata, S. V. Wood, Mon. Crag Moll., pt. i, p. 32, pl. iii, fig. 9, 1848.

Mus. Pract. Geol. London, York, Ipswich.

Semicassis saburon (Bruguière).

Cassis saburon, Beyrich, Zeitsch. deutsch. Geol. Ges., vol. vi, p. 480, pl. xii, fig. 5, 1854.

Cassidaria sp., Lankester, Quart. Journ. Geol. Soc., vol. xxvi, p. 502, pl. xxxiv, fig. 8, 1870.

In most collections.

Echinophoria sulcosa (Lamarck).

Cassis sulcosa, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 179, pl. xv, fig. 8, 1856.

Cassidaria sp., Lankester, Quart. Journ. Geol. Soc., vol. xxvi, p. 502, pl. xxxiv, fig. 9, 1870.

Mus. Pract. Geol. London, Ipswich.

Echinophoria Rondeleti (Basterot).

Cassis Rondeleti, Basterot, Mém. Géol. sur les Env. de Bordeaux, p. 51, pl. iii, fig. 22; pl. iv, fig. 13, 1825.

Cassis Rondeleti, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 307, pl. iv, fig. 9, 1907.

Mus. Ipswich.

[The late Mr. C. Reid includes *Cassidaria bicatenata* in his list of Mollusca from the Suffolk boxstones. Plioc. Dep. of Britain, p. 13. It is probably a clerical error.]

Ficula acclinis (S. V. Wood).

Pyrula acclinis, S. V. Wood, Mon. Crag Moll., pt. ii, p. 311, pl. xxxi, fig. 6, 1850. In most collections.

[The most characteristic feature of this species is the great breadth of the upper part of the whorls. *Pyrula condita* in Hörnes' great work, vol. i, pl. xxviii, fig. 4, seems to agree with Wood's shell.]

Ficula cingulata (Bronn).

Pyrula cingulata, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 676, pl. xxviii, fig. 1, 1856 (figured as *P. reticulata*). Mus. Pract. Geol. London, York, Ipswich.

Ficula condita (Brongniart).

Pyrula condita, Brongniart, Mém. sur les Terr. du Vicentin, p. 75, pl. vi, fig. 4, 1823.

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Pyruia reticulata, S. V. Wood, Mon. Crag Moll., pt. i, p. 42, pl. ii, fig. 12, 1848.

Mus. Pract. Geol. London, York, Ipswich.

Ficula cf. *geometra* (Borson).

Pyruia geometra, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 271, pl. xxviii, fig. 7, 8, 1856. Mus. Pract. Geol. London.

[A graceful cast in this museum may be assigned to this species with some uncertainty. In form and outline, however, it corresponds to Hörnes' and Sacco's figures of the shell.]

Pseudocassis sphaerica (Philippi).

Cypræa sphaerica, Beyrich, Zeitsch. deutsch. geol. Ges., vol. v, p. 319, pl. iv, fig. 9, 1853. Mus. York.

[Mr. F. W. Harmer has in his collection a cast of a shell belonging to this group, having the inner whorls coiled on a flat plane round the apex as in some of the Conidæ, height 30 mm., breadth 20 mm., found at Waldringfield. For the genus see Fischer, Manuel de Conchyliologie, p. 668.]

Trivia pisolina (Lamarck).

Cypræa pisolina, Lamarck (Deshayes), Anim. sans Vertèbr., 2nd ed., vol. vii, p. 408, 1822.

Trivia pisolina, F. W. Harmer, Plioc. Moll. Gt. Brit., pt. i, p. 50, pl. ii, fig. 17, 1913.

Moore Coll.

Rimella gracilentia (S. V. Wood).

Rostellaria (?) *gracilentia*, S. V. Wood, Mon. Crag Moll., Suppl. 3, p. 1, pl. i, fig. 1, 1882. Mus. Ipswich.

Rimella lucida (?), (S. V. Wood), J. Sowerby.

Rostellaria lucida (?), S. V. Wood, Mon. Crag Moll., Suppl. 1, pt. i, p. 5, pl. ii, fig. 14, 1872. Mus. Ipswich.

Rostellaria dentata, Grateloup.

Rostellaria dentata, Grateloup, Atlas Conch. foss. de l'Adour, No. 32, fig. 4, 1840.

„ „ Cossmann, Ess. Paléoconch. compar., vol. vi, p. 19, pl. ii, fig. 12, 13, 1904.

Mus. Ipswich.

Hippochrenes ampla Rutoti, var. nov.

Rostellaria ampla, Rutot, Ann. Soc. malac. Belge, vol. xi, p. 33, pls. i, ii, 1874. Mus. Norwich (spire), Ipswich (body).

Aporrhais speciosus (Schlotheim).

Aporrhais speciosus, Beyrich, Zeitsch. deutsch. geol. Ges., vol. vi, p. 492, pl. xiv, figs. 1-3, 1854.

„ „ Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 302, pl. iii, fig. 24, 1907.

Mus. Ipswich.

Cerithium acuticosta angulatio, Sacco.

Cerithium acuticosta, var. *angulatio*, Sacco, Moll. Terr. terz. Piemonte, pt. xvii, p. 4, pl. i, fig. 6, 1895. Mus. Norwich.

Vermetus (*Burtinella*) *Bognoriensis*, Mantell.

Vermetus Bognoriensis (?), S. V. Wood, Mon. Crag Moll., pt. i, p. 114, pl. xii, fig. 9, 1848. Mus. Ipswich.

[This shell (or annelid) is commonly diffused in the loose sands of the older Red Crags, as well as in the hardened original matrix. S. V. Wood, Sunnl. 3. n. 1.]

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Vermilia flagelliformis (Morris).

Serpula flagelliformis, J. Sowerby, Min. Conch., vol. vii, p. 50, pl. dcxxxiv, figs. 2, 3, 1844. Attached to shell of *Pectunculus*. Mus. York.

Turritella Geinitzi, Speyer.

Turritella Geinitzi, Speyer, Palæontographica, vol. xvi, p. 22, pl. ii, fig. 2, 1866.

„ „ Norregaard, Danske Geol. Forening, vol. v, p. 122, pl. iii, fig. 7, 1916.

Mus. Ipswich.

Xenophora Deshayesi (Michelotti).

Xenophora Deshayesi, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 442, pl. xlv, fig. 12, 1856.

„ „ Sacco, Moll. Terr. terz. Piemonte, pt. xx, pl. ii, fig. 20, 1896.

Mus. Pract. Geol. London.

Xenophora scrutaria (Philippi).

Trochus scrutaria, Philippi, Beit. Tert. N.W. Deutschlands, p. 22, pl. iii, fig. 37, 1843.

Xenophoria scrutaria, Speyer, Palæontographica, vol. xvi, p. 328, pl. xxxiv, fig. 8, 1866.

Mus. Pract. Geol. London.

Natica achatensis (Recluz MS.), de Koninck.

Natica achatensis, de Koninck, Coq. foss. Basele, p. 9, 1837.

Natica glaucinoides, Nyst, Coq. foss. Belge, p. 442, pl. xxxvii, fig. 32, 1843.

Mus. Pract. Geol. London, York, Ipswich.

Natica Nysti, cf. D'Orbigny.

Natica Nysti, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 293, pl. iii, fig. 10, 1907. In most collections.

Natica cf. *hantoniensis*, Pilkington.

Natica hantoniensis, von Koenen, Palæontographica, vol. xvi, p. 148, pl. xii, fig. 9, 1867.

„ „ Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 290, pl. iii, fig. 6, 1907.

Mus. York.

[This fine cast, height 33 mm., breadth 25 mm., is clean from any adventitious matter. Its globose form and straightness of columella indicate its connection with the above species. Unfortunately the outer mould was not preserved.]

Natica (*Crommium*) *ferruginea italica* (Sacco).

Crommium ferrugineum italica, Sacco, Moll. Terr. terz. Piemonte, pt. ix, p. 8, pl. i, fig. 8, 1891. Mus. Pract. Geol. London, Ipswich.

Natica elongata, Michelotti.

Natica elongata, Michelotti, Et. Mioc. Inf. d'Italie, p. 88, pl. x, fig. 34, 1861.

Euspirocrommium elongatum, Sacco, Moll. Terr. terz. Piemonte, pt. ix, p. 10, pl. i, fig. 11, 1891.

Stanley Coll.

Niso sp.

[The cast referred to this genus exhibits the perforated axis very clearly, and is probably that of one of the many forms of *Niso* (*Bonellia*) *terebellata*, Grateloup, figured by Sacco, Moll. Terr. terz. Piemonte, pt. xi, pl. i, figs. 39-52. Harmer Coll.]

Bolma granosa miocenica, Sacco.

Bolma granosa miocenica, Sacco, Moll. Terr. terz. Piemonte, pt. xxi, p. 13, pl. i, fig. 28, 1896. Mus. Pract. Geol. London.

Phorcus striatus, Risso.

Phorcus striatus, Risso, Hist. Nat. Eur. merid., vol. iv, p. 134, 1826.

[Risso's diagnosis of this species, which he only knew as fossil, equally describes the boxstone shell, so as to render them practically identical. Mus. Ipswich.]

Calliostoma millegranus precedens (von Koenen).

Trochus labarum (?), Basterot, Mém. Géol. de l'Env. de Bordeaux, 1825, p. 33, pl. i, fig. 23.

Trochus miliaris, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 454, pl. xlv, fig. 9, 1856.

Trochus millegranus precedens, von Koenen, Mioc. N. Deutschlands (Marburg), p. 308, 1872.

Mus. Pract. Geol. London.

Calliostoma Xavieri (Costa MS.).

Trochus Xavieri, Dollfus, Cotter, & Gomes, Moll. tert. du Portugal, p. 6, pl. xxxi, fig. 4, 1903.

Zizyphinus opisthothenus, cf. Fontannes, Moll. Plioc. de la Vall. du Rhone, vol. i, p. 218, p. xi, fig. 22, 1897.

Mus. Ipswich.

Dentalium sp.

(?) *Dentalium fossile*, Hörnes, Foss. Moll. Tert. Wien, vol. i, p. 657, pl. i, fig. 36, 1856. Stanley Coll.

Dentalium Kickxii, Nyst.

Dentalium Kickxii, Nyst, Coq. foss. Belge, p. 342, pl. xxxvi, fig. 1, 1843.

„ „ Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 286, pl. iii, fig. 4, 1907.

Mus. Pract. Geol. London.

Spondylus sp.

[The genus is represented by a perfect upper valve with the inner side exposed showing the characteristic dentition. It is recorded from the Belgian Oligocenes. See Vincent, Ann. Soc. malac. de Belge, vol. xxiii, 1888. Mus. York.]

Pecten (Chlamys) Malvinæ, Dubois de Montperoux.

Pecten Malvinæ, Dubois de Montperoux, Coq. foss. Wolhyma, p. 71, pl. viii, figs. 2-3, 1831.

„ „ Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 414, pl. lxiv, fig. 5, 1870.

Stanley Coll.

Pecten (Chlamys) Sollingensis, von Koenen.

Pecten Sollingensis, von Koenen, Palæontographica, vol. xvi, p. 228, pl. xxvi, figs. 7, 8, 1867.

„ „ Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 251, pl. i, fig. 1, 1907.

Mus. Pract. Geol. London.

Pecten (Chlamys) Hoeninghausii, DeFrance.

Pecten Hoeninghausii, Nyst, Coq. foss. Belge, p. 286, pl. xxii, fig. 2, 1843.

Pecten disparatus, S. V. Wood, Mon. Crag Moll., Suppl. 3, p. 12, pl. i, fig. 17, 1882.

Stanley Coll., Brit. Mus. (Nat. Hist.) London.

Pecten (Chlamys) substriatus, D'Orbigny.

Pecten substriatus, Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 408, pl. lxiv, fig., 1870. Harmer Coll.

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Pecten (Chlamys) rupeliensis (von Koenen).

Pecten rupeliensis, von Koenen, Palæontographica, vol. xvi, p. 232, pl. xxvi, fig. 12, 1867. Mus. Pract. Geol. London, Stanley Coll.

Pecten (Chlamys) cf. Erslevi, Harder.

Pecten Erslevi, Harder, Danm. geol. Underseg., vol. ii, p. 44, pl. iii, figs. 3, 4, 1913. Mus. Pract. Geol. London.

[A fragment in the M.P.G. seems to agree with Harder's figure.]

Pecten (Peplum) sp.

Pecten verrucopsis, de Gregorio, Ann. de Geol., pt. xiii, p. 26, pl. iv, figs. 89, 90, 1894.

Pecten clavatus, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 252, pl. i, fig. 2, 1907.

Mus. Pract. Geol. London.

[Of the two figures cited above, Gregorio's comes nearest to the M.P.G. fragment.]

Pecten (Chlamys) excisus, Bronn.

Chlamys excisus, Dollfus & Cotter, Moll. Tert. du Portugal, 1909, p. 77, pl. viii, figs. 5-9.

[I found a characteristic fragment of this species in Newbourne Crag pit.]

Hinnites crispus (Brocchi).

Hinnites crispus, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 10, pl. ii, fig. 1, 1897. Stanley Coll.

Pinna pectinata Brocchi (D'Orbigny).

Pinna Brocchi, Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 372, pl. i, figs. 1, 2, 1870.

Pinna pectinata Brocchi, Sacco, Moll. Terr. terz. Piemonte, pt. xxv, p. 29, pl. viii, fig. 1, 1898.

Mus. York, Stanley Coll.

Mytilus corrugatus, Brongniart.

Mytilus corrugatus, Brongniart, Mém. sur les tert. du Vicentin, p. 78, pl. v, fig. 6, 1823. Stanley Coll.

Arcoperna sericea (Bronn).

Modiola sericea, Philippi, En. Moll. Sic., vol. i, p. 71, pl. v, fig. 14, 1836.

„ „ S. V. Wood, Mon. Crag Moll., pt. ii, p. 61, pl. viii, fig. 3, 1850.

Mus. Ipswich.

Pectunculus Philippi, Deshayes.

Pectunculus pulvinatus, var., Philippi, Beit. N.W. deutsch. tert., p. 13, pl. ii, fig. 13, 1843.

Pectunculus Philippi, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 262, pl. i, fig. 17, 1907.

Mus. Ipswich.

Pectunculus Bormidianus, Mayer.

Pectunculus Bormidianus, Mayer, Foss. Mus. Zurich, pt. iii, p. 49, 1868.

Azinea Bormidiana, Sacco, Moll. Terr. terz. Piemonte, pt. xxvi, p. 37, pl. ix, figs. 11-15, 1898.

Mus. Norwich, etc.

Pectunculus inflatus (Brocchi).

Arca inflata, Brocchi, Conch. foss. Subap., p. 494, pl. xi, fig. 7, 1814.

Azinea inflata, Sacco, Moll. Terr. terz. Piemonte, pt. xxvi, p. 32, pl. viii, figs. 1-6, 1898.

In most collections.

[*Pectunculus pilosus* and *P. glycimeris* are amongst the commonest forms in the boxstones, and probably other members of this variable group are present.]

Nucula donaciformis, Harder.

Nucula donaciformis, Harder, Danm. geol. Undersøg., vol. ii, p. 49, pl. iii, fig. 10, 1913. Stanley Coll.

Nucula placentina, Lamarck.

Nucula placentina, Philippi, En. Moll. Sic., vol. i, p. 65, pl. v, fig. 7, 1836.
 „ „ Sacco, Moll. Terr. terz. Piemonte, pt. xxvi, p. 46, pl. x, figs. 35-40, 1898.

Mus. Ipswich.

Nucula Haesendonckii, Nyst & Westendorp.

Nucula Haesendonckii, Nyst, Coq. foss. Belge, 1843, p. 236, pl. xviii, fig. 5.

[Sir E. Ray Lankester informs me that he had identified this very distinct species in the collection of the late Dr. Taylor in Ipswich. Unfortunately the specimen has been lost sight of.]

Nucula turgens, S. V. Wood.

Nucula turgens, S. V. Wood, Mon. Crag Moll., Suppl. 2, p. 44, pl. v, fig. 6, 1879.
 Mus. Brit. Nat. Hist., Wood Coll.

Leda Deshayesiana (Du Chastel Coll.).

Nucula Deshayesiana, Nyst, Coq. foss. Belge, p. 221, pl. xv, fig. 8, 1843.
Leda Deshayesiana, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 258, pl. i, figs. 7, 8, 1907.

Stanley Coll.

Venericardia antiquata rhomboidea (Brocchi).

Chama rhomboidea, Brocchi, Conch. foss. Subap., p. 523, pl. xii, fig. 16, 1814.
Cardita (Glans) rhomboidea, Cerulli-Irelli, Pal. ital., vol. xiii, p. 135, pl. xii, fig. 28, 1907.

Mus. York.

Astarte Henckeliusiana, Nyst.

Astarte Henckeliusiana, Nyst, Coq. foss. Belge, p. 154, pl. ix, fig. 4, 1843.
 „ „ von Koenen, Palæontographica, vol. xvi, p. 250, pl. xxix, fig. 7, 1867.

Mus. Pract. Geol. London.

Astarte Kickxii, Nyst.

Astarte Kickxii, Nyst, Coq. foss. Belge, p. 157, pl. x, fig. 3, 1843.
Astarte Kickxii, Ravn, K. Danske Vid. Selsk. Skrift (7), vol. iii, p. 268, pl. i, fig. 21, 1907.

Mus. Pract. Geol. London, Stanley Coll.

Astarte cf. *solidula*, Deshayes.

Astarte solidula tauroscalarata, Sacco, Moll. Terr. terz. Piemonte, pt. xxvii, p. 25, pl. vi, fig. 29, 1899. Mus. Pract. Geol. London.

[Length 18 mm., breadth 22 mm.; sculpture, 6 or 7 thick concentric ribs. The number of these vary according to Sacco's figures of *A. solidula*.]

Cardium cingulatum, Goldfuss.

Cardium cingulatum, Goldfuss, Petr. Germ., vol. ii, p. 222, pl. cxlv, fig. 4, 1838.

„ „ Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 177, pl. xxv, fig. 1, 1870.

Mus. York, Ipswich.

[*C. venustum*, Lamk., non S. V. Wood, and *C. umbonatum*, A. Bell, non Sowerby.]

Cardium Woolnoughi, sp. nov.

[The species here referred to is not rare, but does not appear to have been figured or described by any Continental writer. In shape it is roundly ovate, tumid, and nearly equilateral, garnished with twenty-five to thirty narrow rounded prominent ribs continued below the lower margin with rather wider interspaces. The surface is much decorticated, leaving four or five ridges marking probably stages of growth. Mus. Ipswich.]

Cardium subdecorticatedum, A. Bell.

Cardium subdecorticatedum, A. Bell, Journ. Ipswich Field Club, vol. iii, p. 9, 1911.

Cardium cf. decorticatedum tenellum, S. V. Wood, Mon. Crag Moll., pt. ii, p. 159, pl. xiv, fig. 1d, 1850.

In most collections.

[The above shell is decorticated as in Wood's figure, but the ribs are more open = *C. decorticatedum* of Lankester and Reid.]

Isocardia cor (Linné).

Isocardia cor, S. V. Wood, Mon. Crag Moll., pt. ii, p. 193, pl. xv, fig. 9, 1850.

„ „ Forbes & Hanley, Brit. Moll., vol. i, p. 472, vol. iv, pl. xxxiv, fig. 2, 1853.

Mus. York, Ipswich.

Isocardia lunulata, Nyst.

Isocardia lunulata, Nyst, Coq. foss. Belge, p. 198, pl. xv, fig. 2, 1843.

„ „ Lankester, Quart. Journ. Geol. Soc., vol. xxvi, p. 502, pl. xxxiv, fig. 10, 1870.

In all collections.

Cyprina tumida, Nyst.

Cyprina tumida, Nyst, Coq. foss. Belge, p. 148, pl. x, fig. 1, 1843.

Cyprina rustica (tumida), S. V. Wood, Mon. Crag Moll., pt. ii, p. 197, pl. xviii, fig. 1, 1850.

Mus. York.

Cyprina scutellaria (Lamarck).

Cyprina scutellaria, Nyst, Coq. foss. Belge, p. 145, pl. vii, fig. 5; pl. viii, fig. 1, 1843. In most collections.

Cyprina islandica æqualis (J. Sowerby).

Cyprina æqualis, Goldfuss, Petr. Germ., p. 236, pl. cxlviii, fig. 5, 1838.

Cyprina islandica, S. V. Wood, Mon. Crag Moll., pt. ii, p. 196, pl. xviii, figs. 2a, b, 1850.

Cyprina islandicoides, Lamarck.

Venus islandicoides, Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 121, pl. xiii, fig. 2, 1870.

Amiantis islandicoides, Sacco, Moll. Tert. terz. Piemonte, pt. xxviii, p. 21, pl. v, figs. 1-4, 1900.

Meretrix chione, Linné.

Meretrix (Callista) chione elongata, Bucquoy, Dollfus, & Dautzenberg, Moll. du Roussillon, vol. ii, p. 328, pl. lii, fig. 10, 1893.

Meretrix (Callista) chione, Cerulli-Irelli, Pal. ital., vol. xiv, p. 43, pl. viii, figs. 9, 10, 1908.

Moore Coll.

[Major Moore has in his collection a fine mould of the interior of a shell, corresponding to the above, found at Waldringfield.]

Ventricola multilamella (Lamarck), var. *Boryi*, Deshayes.

Venus sp., Lankester, Quart. Journ. Geol. Soc., vol. xxvi, p. 502, pl. xxxiv, fig. 7, 1870.

Ventricola multilamella, *Boryi*, Sacco, Moll. Terr. terz. Piemonte, pt. xxviii, p. 31, pl. viii, fig. 9, 1900.

Mus. Ipswich, Stanley Coll.

[The "boxstone" mould so closely approximates to the shell figured by Sacco that it may be regarded as the same species; the more so because *V. multilamella* is somewhat variable in outline.]

Meretrix (*Callista*) *fragilis* (Münster).

Venus fragilis, Goldfuss, Petr. Germ., vol. ii, p. 247, pl. cxlviii, fig. 8, 1840.

Venus circularis, A. Bell, Journ. Ipswich Field Club, vol. iii, p. vii, 1911.

Mus. Ipswich.

Meretrix (*Callista*) *suborbicularis* (Goldfuss).

Venus suborbicularis, Goldfuss, Petr. Germ., vol. ii, p. 247, pl. cxlviii, fig. 7, 1840. Mus. Ipswich.

[The shell quoted or figured by Koninek, Nyst, Ravn, and other writers as *Venus* or *Meretrix incassata*, Sow., does not seem to be the same as the English shell of that name.]

Tapes vetula (Basterot).

Venus vetula, Basterot, Mém. géol. sur les Env. de Bordeaux, p. 89, pl. vi, fig. 7, 1825.

Tapes vetulus, Dollfus & Dautzenberg, Mém. Soc. géol. France, vol. xiv, p. 176, pl. ii, figs. 1-6, 1906.

Mus. Pract. Geol. London.

Donax minutus, Bronn.

Donax minutus, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 4, pl. i, figs. 8, 9, 1901. Mus. Pract. Geol. London, Ipswich.

Solenocurtus Basteroti, Desmoulins.

Solenocurtus Basteroti, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 15, pl. iv, fig. 1, 1901.

„ „ Dollfus, Cotter, & Gomes, Moll. tert. Portugal, p. 27, pl. i, figs. 7-10, 1903.

Mus. Pract. Geol. London.

Solen (*Ensis*) cf. *Rollei* (Hörnes).

Ensis Rollei, Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 15, pl. i, fig. 14, 1870.

„ „ Dollfus & Dautzenberg, Mém. Soc. géol. France, vol. x, p. 65, pl. ix, figs. 35-8, 1902.

Mus. Ipswich.

Mactra miocænica, Dollfus & Dautzenberg.

Mactra miocænica, Dollfus & Dautzenberg, Mém. Soc. géol. France, vol. xi, p. 109, pl. vi, figs. 10, 11, 1904. Mus. Pract. Geol. London, Ipswich.

[*M. podolica*, Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 62, pl. vii, fig. 5, may be a variant of this species.]

Mactra triangula, Renier.

Mactra triangulata, S. V. Wood, Mon. Crag Moll., 1850, pt. ii, p. 325, pl. xxi, fig. 21. Stanley Coll.

Mactra trinacria, Speyer, Palæontographica, vol. xvi, p. 34, pl. iii, fig. 4, 1861. Mus. Pract. Geol. London, York.

[The principal difference between *M. triangulata* and *M. trinacria* seems to be that the latter forms a more equilateral triangle than the other. Both are probably related to the recent *M. elliptica*.]

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Lutraria sanna, Basterot.

Lutraria sanna, Basterot, Mém. géol. sur les Env. de Bordeaux, p. 94, pl. vii, fig. 13, 1825.

„ „ Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 31, pl. viii, fig. 5, 1901.

Mus. Pract. Geol. London, Ipswich.

Lutraria ovalis, sp. nov.

Lutraria sanna, Hörnes, Foss. Moll. Tert. Wien, vol. ii, p. 56, pl. v, fig. 5, 1870.

„ „ Dollfus, Cotter, & Gomes, Moll. tert. du Portugal, p. 30, pl. iv, fig. 4, 1903.

[Allied to *L. oblonga*, Chemnitz.]

Lutraria elliptica Jeffreysi, De Gregorio.

Lutraria elliptica Jeffreysi, De Gregorio, Boll. Soc. malac. ital., vol. x, p. 143.

Lutraria lutraria Jeffreysi, Cerulli-Irelli, Pal. ital., vol. xv, p. 143, pl. xv, fig. 9, 1909.

Mus. Pract. Geol. London, Norwich, Ipswich.

Corbulomya complanata, var. B, Nyst.

Corbulomya complanata, Nyst, Coq. foss. Belge, p. 59, pl. ii, fig. ii, 1843. Stanley Coll.

Panopæa Menardi, Deshayes.

Panopæa Menardi, Hörnes, Foss. Moll. tert. Wien, vol. ii, p. 29, pl. ii, figs. 1-3, 1870.

Glycimeris Menardi, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 43, pl. xii, fig. 4, 1901.

In most collections.

Panopæa declivis, Michelotti.

Lutraria declivis, Michelotti, Etud. Mioc. Inf. d'Ital., p. 57, pl. vi, fig. 1, 1861.

Glycimeris intermedia declivis, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 45, pl. x, fig. 6, 1901.

Mus. Pract. Geol. London.

Panopæa Gastaldi (Michelotti).

Panopæa Gastaldi, Michelotti, Etud. Mioc. Inf. d'Ital., p. 54, pl. v, fig. 10, 1861.

Glycimeris intermedia Gastaldi, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 45, pl. x, fig. 4, 1901. Mus. Ipswich.

Panopæa (?) *acutangula* (Michelotti).

Lutraria acutangula, Michelotti, Etud. Mioc. Inf. d'Ital., p. 57, pl. vi, fig. 2, 1861.

Glycimeris intermedia acutangula, Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 46, pl. xii, fig. 10, 1901.

Mus. Ipswich.

Cyrtodaria vagina (S. V. Wood).

Glycimeris angusta, S. V. Wood, Mon. Crag Moll., pt. ii, p. 291, pl. xxix, fig. 2, 1850. Mus. Pract. Geol. London.

[I do not think this to be the same shell as the *Glyc. angusta* of Nyst's memoir, pl. ii, fig. 1. The latter has a more pointed extremity. This I have had from the Red Crag. Mr. Stanley has a small shell in his sandstone collection from Bawdsey which may be the same.]

Lucina (Dentilucina) Barrandei, Mayer.

Lucina Barrandei, Mayer, Journ. de Conch., vol. xix, p. 340, pl. x, fig. 1, 1871.

Dentilucina Barrandei, var., Sacco, Moll. Terr. terz. Piemonte, pt. xxix, p. 83, pl. xix, figs. 7-9, 1901.

Lucina Canhami, A. Bell, Journ. Ipswich Field Club, vol. iii, p. 9, 1911.
Mus. Ipswich.

Syndosmya sp.

[Two or three species of this group are present in the "boxstones", possibly the *Erycina longicallis* and *E. similis*, figured in Philippi, En. Moll. Sic., vol. ii, pl. xiii, figs. 7, 8, but they are not sufficiently definite for accurate determination. Stanley Coll.]

Syndosmya prismatica (Montagu).

Ligula donaciformis, Nyst, Coq. terr. Belge, p. 92, pl. iv, fig. 9, 1843.

Abra prismatica, S. V. Wood, Mon. Crag Moll., pt. ii, p. 239, pl. xxii, fig. 13, 1850.

Mus. Pract. Geol. London, York.

Thracia ventricosa, Philippi.

Thracia ventricosa, Philippi, En. Moll. Sic., vol. ii, p. 17, figured in vol. i, pl. i, fig. 10 (as *T. pubescens*), 1844.

Thracia ventricosa, S. V. Wood, Mon. Crag Moll., Suppl. 2, p. 48, pl. v, fig. 3, 1879.

Mus. Ipswich.

Teredo borings in wood are not uncommon, but the shells have entirely disappeared.

[Certain shells of pre-Crag origin are found in the Oakleyan and Newbournian zones of the Red Crag, and as some of these also occur embedded in the boxstones they are presumably of the same age.

Most of these are figured by Mr. S. V. Wood in the Supplements to the Crag Mollusca, and by Mr. F. W. Harmer in the Monograph on the Pliocene Mollusca now in course of publication.

A few like the *Rimella*, *Serpula*, *Turritella*, and *Venericardia* occur in profusion, but as a rule the majority are single specimens, as in the following list:—

Borsonia suffolciensis.

Pleurotoma denticulata.

„ *interrupta*.

„ *nodifer*.

„ *plebeia*.

„ *Selysii*.

Cancellaria evulsa.

Ancillaria glandiformis.

Volutilithes luctatrix.

„ *nodosa*.

„ *suturalis*.

Mitra fusiformis (?).

Fusus abrasus.

„ *crispus*.

Purpura derivata.

Stenomphalus Weichmanni.

Triton connectens.

Ranella (?) *anglica*.

Semicassis saburon.

Rimella, two or three species.

Turritella, two or three species.

Solarium, two or three species.

Ostrea, two or more species.

Pecten Hæninghausii.

„ *Sollingensis*.

Venericardia, several varieties.

Lucina crassidens.

I have not seen any specimens of the typical *Voluta Lamberti* of the English or Belgian Crag, or of *Pyrula (Ficula) reticulata*, or *Cassidaria bicatenata* in the "boxstones". The latter, however, is said to occur sparingly in the "Sables noirs d'Anvers".

Voluta Lamberti, *Atractodon elegans*, and *Cassidaria bicatenata* are occasionally washed ashore on the coast, from Aldborough to Walton-on-the-Naze,

derived from some deposit probably of Diestian or Anversian age. Mr. Harmer has in his collection a worn shell of the *V. Lamberti* group, showing distinctly broad and swollen ribs on the upper whorls obtained from the Felixstowe shore.

Very few invertebrate remains other than the Mollusca have been obtained in the East Anglian area. I have only noticed, or found recorded:—

Crustacea.

Cæloma sp. (? *rupeliense*, Strainer), and segments of a narrow lobster-like species.

Balanus inclusus (fide Lankester), *B. unguiformis*.

Radiata.

Cyphosoma tertiarium, Cotteau.

Diadema megastoma, A. Bell.

Solaster Reedi, n.sp.

[This unique example belongs to the Reed Collection in the York Museum. It exhibits the dorsal surface of a thick fleshy starfish, covered with bunches of short fasciculate spines scattered over the surface, as they are in the recent *S. furcifer*.

Mr. W. K. Spencer, F.G.S., has kindly furnished me with the following notes of dimensions: "Major radius 33 mm. (approx.), minor radius 13 mm., width of arm at base 14 mm., no. of arms six."]

Cœlenterata.

Flabellum cuneata, Goldfuss, and another species.

Solenastrea Prestwichii, Duncan.

Trochocyathus anglicus, Duncan.

Woods, fruits, and nuts are common in the Belgian Rupelian deposits, and our sub-Crags are rich in these. Mr. W. Carruthers told me many years ago that he had determined three Angiospermous Dicotyledons, one conifer, and two palms. Certain plants or fruits retain their forms when phosphatized both in exterior shape and internal structure, but whether these have any relations to either of the woods present is not yet known. Mus. Ipswich, Saffron Walden.

Amber has been obtained from the Cromer Forest Bed, and Mr. C. Reid has referred to a variety of spiders, insects, etc., in amber washed up on the East Anglian coast, Trans. Norfolk and Norwich Nat. Hist. Soc., vols. iii-v. Mr. A. H. Foord, F.G.S., in vol. v, p. 92, figures many of these, including bees, beetles, cockroaches, and spiders, submitted to, and partly named by, Mr. C. O. Waterhouse and the Rev. O. P. Cambridge. Whether of the same age as the above woods has yet to be determined.

NOTICES OF MEMOIRS.

I.—ON MAMMALIAN BONES FROM EXCAVATIONS IN THE LONDON DISTRICT. By ARTHUR SMITH WOODWARD, LL.D., F.R.S.¹

IN an area so long populated as the London district the surface deposits are naturally very varied, and those of the historic period contain remains not only of the indigenous fauna but also of man's accidental importations. Even so late as the twelfth century William Fitzstephen wrote that the woods close to the city were well stocked with game—"stags, fallow-deer, boars, and wild bulls." Their bones and teeth are often found, besides the remains of other animals, perhaps partly of somewhat earlier date, among which the beaver is especially interesting. Bones of the beaver are indeed so

¹ Abstract of a lecture delivered to the South-Eastern Union of Scientific Societies at Burlington House, London, on June 7, 1917.