Sheet 23 (Scotland)", p. 39. Dr. Peach mapped a neck near East Grange, $5\frac{1}{2}$ miles west of Dunfermline, the cross-section of which was ascertained in underground workings.¹ A somewhat similar case is that of Knock Hill in the Saline Hills.² The vertical extension of necks piercing the Calciferous Sandstone series has also been proved in the shale mines in the oil-shale field west of Edinburgh. Mr. H. M. Cadell³ has described a remarkably good instance from the Broxburn oil-shale workings near Philipstoun (West Lothian). At a depth of 120 feet below the surface a mine was driven from a level in the Broxburn Oil-shale through the tuff of the neck into the oil-shale on the other side. The neck was 360 feet broad on this line of section, and the oil-shale on approaching the tuff dipped steeply towards it on each side. The walls of the neck were quite perpendicular and somewhat slickensided, like the face of a fault.

For information, and for giving us all facilities to examine the stone-mine through the neck, we are indebted to Mr. Henry Rowan, general manager of the Fife Coal Company.

III.—NEW SPECIES OF CRETACEOUS BRYOZOA.

By Professor J. W. GREGORY, D.Sc., F.R.S., F.G.S., University of Glasgow.

THE second volume of the Catalogue of Cretaceous Bryozoa in the British Museum, of which the manuscript has been completed, contains the description of various new Cretaceous species. Such a catalogue inevitably takes some months in passing through the press, during which it might happen that the species were anticipated by description elsewhere. To avoid the risk of reduplication of the names it is most convenient to publish the diagnoses. Fuller accounts of the species, with illustrations, will be given in the Catalogue.

MULTITUBIGERA, d'Orbigny, 1853.

Multitubigera sulcata,⁴ n.sp.

Diagnosis.—Zoarium massive and thick. Radial ridges of each zoecial sub-colony short, thick, and wedge-shaped. Apertures triserial to multiserial at the ends of the radii. The zoecial colonies are elliptical, and usually separated by valleys or depressed porous areas, and not by definite regular laminae.

Distribution.—Senonian—Maastrichtian: Maastricht.

DISCOFASCIGERA, d'Orbigny, 1853.

Discofascigera vinei, n.sp.

Diagnosis.—Zoarium small, with a short, pointed base, covered by epizoarium. The upper surface is flat, with small raised marginal projections. In young zoaria the apertures are sparse and widely scattered.

Distribution.—Cambridge Greensand: Cambridge.

FASCICULIPORA, d'Orbigny, 1846.

Fasciculipora spicata, n.sp.

Diagnosis.—Zoarium with a narrow stem, widening into a thick horizontal expansion, from which rise numerous short, blunt fasciculi. The zoarium seen from

¹ *Ancient Volcanoes*, vol. i, p. 426.

² Loc. cit., p. 435.

³ "On an Ash Neck in the Broxburn Shale Workings at Philipstoun": *Trans. Edinburgh Geol. Soc.*, 1899, vol. vii, p. 477.

⁴ So named on account of its furrows between the sub-colonies.

above is roughly triangular. The head includes about ten bundles of zoecia, which rise upward in sharp spikes. The bundles are grooved longitudinally and branch dichotomously; the sides, when worn, appear punctate, but in well-preserved specimens are marked with longitudinal ridges, decorated by small points.

Distribution.—England—Chalk: South-east of England. Foreign—Senonian (Campanian): Ciply.

RETENOA,¹ nov. gen.

Diagnosis.—Theonoidæ with an erect frondose zoarium, composed of a network of dichotomous, anastomosing branches. The apertures all open on one face of the zoarium.

Type Species.—*Retenoea campicheana* (Orb.), 1853. Neocomian: Sainte-Croix, Switzerland.

HOMÆOSOLEN, Lonsdale, 1850.

Homæosolen gamblei, n.sp.

Diagnosis.—Zoarium frondescens, of crowded multipinnate branches. The branching is irregular; the branchlets cross and intersect, but do not anastomose. The back of the distal parts of the branches is traversed by longitudinal, fluted, or carinate ridges, which form a strong median carina; but this structure may be replaced by transverse wrinkling in the proximal ends of the branches in old specimens. Gonœcia ovoid; attached to base of the pinnules on the obverse face.

Distribution.—Upper Chalk (zone of *Micraster coranguinum*): Gravesend; Bromley, Kent. Middle Chalk (zone of *Micraster cortestudinarium*): Chatham. Also from Chalk, zones not recorded, at Charing, Kent; Salisbury; Guildford; Arretton Down, Isle of Wight.

Homæosolen virgulosa, n.sp.

Diagnosis.—Zoarium an erect, irregular tuft, which is repeatedly branched. The branching is irregularly dichotomous. The peristomal bundles are transversely elongated, and may occur in biserial ridges with as many as five apertures in each horizontal, transverse row. Some groups of apertures are irregularly triserial. Reverse surface fluted.

Distribution.—Chalk (zone of *Micraster cortestudinarium*): Chatham.

DISCOCYTIS, d'Orbigny, 1854.

Discocytis profunda, n.sp.

Diagnosis.—Zoarium very small, solid, pointed below, and expanding gradually or rapidly upward to an irregular but horizontal upper surface. The sides are coarsely ridged. Apertures in groups on irregular blunt knobs around the margin of the upper surface; seen from above the groups are radial and separated by irregular, small zoecia.

Distribution.—Chalk: Charing, Kent.

DESMEPORA, Lonsdale, 1850.

Desmepora blackmorei, n.sp.

Diagnosis.—Zoarium of flat, broad branches. The apertures open on the ends of short, ridge-like lateral processes which project along the sides of the stems; these lateral processes are irregularly elliptical; the apertures are generally biserial with about eight in each row of a process, and the series are placed horizontally. The reverse surface is covered by crowded rows of small round pores (cancelli), and the surface is slightly concave.

Distribution.—Upper Chalk (zone of *Actinocamax quadratus*): East Harnham, near Salisbury.

¹ An abbreviation of *Rete-theonoea*, the theonid with a net-shaped zoarium.

Desmepora pinnigera, n.sp.

Diagnosis.—Zoarium composed of short, thick, somewhat swollen branches, which rarely subdivided and are frequently arranged in a cross. There may be five arms. The zoarium is attached by a short peduncle and base. The sides are marked by a series of ridges, which extend across the whole width of the side. Apertures arranged along the lateral ridges; the apertures are biserial or rarely triserial, and there are usually from five to seven in each row. Obverse face of the zoarium concave. The spaces between the raised groups are marked by rows of small, round pores (cancelli) between horizontal ribs.

Distribution.—Upper Chalk: Beachy Head; Dover; Burham, Kent; Sussex. Middle Chalk (zone of *Micraster cortestudinarium*): Chatham; Rochester. Lower Chalk (zone of *Holaster planus*): Dover.

Desmepora reussi, n.sp.

SYNONYMY.—*Desmepora semicylindrica*, von Reuss, 1872. Bry. Unt. Pläner: Paläontogr., vol. xx, pt. i, p. 123, pl. xxx, figs. 6 and 7, non fig. 8.

Diagnosis.—The branches are large, thick, and irregular, and form a short, stout, bushy zoarium. The peristomal groups project as large, blunt knobs; they are usually elliptical or subcircular, and contain from thirty to fifty apertures. They are scattered irregularly over the stems, being sometimes in the middle of the stems. Surface ornamented with long ribs.

Distribution.—Cenomanian—Unter Pläner: Plauen, Saxony.

TREPOSTOMATA.

REPTOMULTICAVA, d'Orbigny, 1853.

Reptomulticava canui, nov. nom.

SYNONYMY.

Reptomulticava tuberosa, d'Orbigny, 1854. Bry. Crét., p. 1036, pl. 791, figs. 13, 14.

non *Alveolites tuberosa*, Römer, 1839. Verst. norddeut. Ool. Nachtrag, p. 14, pl. xvii, fig. 9.

Diagnosis.—Zoarium massive, tuberosous, with small, irregular tuberosities on the upper surface. Zoecia with circular or elliptical apertures, and walls varying in width from one-fifth to occasionally one-half the diameter of the apertures.

Distribution.—Neocomian: St. Dizier and Vassy, Haute Marne.

Reptomulticava fungiformis, n.sp.

Diagnosis.—Zoarium fungiform with broad, short stalk, which may be hidden by the overgrowth of the broad upper surface of the zoarium. The side looks ringed by the overlap of the expanding upper layers. Zoecia small; the apertures in well-preserved specimens are circular. About twelve apertures per sq. mm.

Distribution.—Lower Greensand: Farringdon; Upware.

DEFRANCIOPORA, Hamm, 1881.

Defranciopora libiformis, n.sp.

Diagnosis.—Zoarium of saucer-shaped or cup-shaped sub-colonies, with the base of one resting in the cavity of the sub-colony below. The rims are well rounded and wide. Apertures often in oblique series of three or four in a row, but in some parts of the zoarium the arrangement is irregular. The sides of the sub-colonies, except on the rim, are smooth and imperforate.

Distribution.—Senonian—Maastrichtian: Maastricht.

CERIOPIORA, Goldfuss, 1827.

Ceriopora farringdonensis, n.sp.

Diagnosis.—Zoarium nodular with tuberosous upper surface, and may be sub-pedunculate below. The tubercles, which are sparse and low, pass into short, finger-shaped lobes. Surface smooth, but weathered specimens may look variolated owing

to the formation of depressions. Surface, when well preserved, covered in places by a thin calcareous epizarium, which closes most of the apertures. Zoecia of above average size; from twelve to twenty apertures per sq. mm. Walls thick and distinctly moniliform in longitudinal section. Diameter of zoecia about .2 mm.

Distribution.—Lower Greensand: Farringdon, Berks.

HETEROPORA, de Blainville, 1830.

Heteropora keepingi, n.sp.

SYNONYMY.

Heteropora (Multierescis) michelini, Keeping, 1883. Foss. Neoc. Upware, p. 141. non *Ceripora michelini*, d'Orbigny, 1850. Prod. Pal., vol. ii, p. 143.

Diagnosis.—Zoarium tufted, rising from a thick base, giving off above thick, finger-shaped, simple branches, or knobby branches, which may divide irregularly; branches end bluntly. Mesopores uniserial, or sometimes biserial.

Distribution.—England—Lower Greensand: Brickhill, Upware? (*fide* Keeping); Coxwell and Farringdon, Berkshire; ? Isle of Wight. Foreign—Albian: Grandpré, Ardennes.

Heteropora clavata, Kade, 1852.¹

SYNONYMY.—*Heteropora clavata*, Kade, 1852. Los. Verst. Schanzenb., p. 32.

Diagnosis.—Zoarium clavate, of a short stem which expands regularly upward into a pear-shaped mass. Transverse section irregularly elliptical, flattened on the side. Most of the surface is smooth, but the type-specimen is irregularly pitted. Zoecia large, irregularly scattered. Mesopores large, a circle of five to seven around each aperture; and the circles of mesopores are confluent, so that but one mesopore or line of mesopores occurs between adjacent zoecia.

Distribution.—England—Lower Greensand: Farringdon (Workhouse Pit), Berkshire. Foreign—Remanié in Drift: Schanzenberg, near Meseritz.

Heteropora subæquiporosa,² n.sp.

Diagnosis.—Zoarium funnel-shaped, composed of a thick layer around a hollow axis. Surface pustular, with irregular, indefinite tubercles or knobs. Mesopores large; in single lines between the apertures, but not well marked off from the zoecia.

Distribution.—Upper Greensand: Warminster.

ZONATULA, Hamm, 1881.

Zonatula brydonei, n.sp.

Diagnosis.—Zoarium club-shaped, with a short, narrow stem and an egg-shaped head. The apertures of the zoecia are circular or subcircular. They are divided into groups by alternate horizontal laminae, which extend half-way across the apertures into alternate groups.

Distribution.—Lower Greensand: Farringdon, Berkshire.

DISCOCAVEA, d'Orbigny, 1853.

Discocavea reussi, n.sp.

SYNONYMY.—*Heteroporella collis* (non d'Orb.), von Reuss, 1872. Bry. unt. Quad. Elbthalg.: Palæontogr., vol. xx, pt. i, p. 133, pl. xxxiii, fig. 6.

Diagnosis.—Zoarium small, circular, convex, with a small central depression, on the floor of which are about fifteen apertures. Radial series of apertures numerous

¹ Kade's name is practically a list name, and the description is therefore included in this paper.

² Named from the comparatively slight difference in size between the zoecia and mesopores.

and crowded, separated by only very narrow inter-radial furrows. About seven apertures in each ray. Apertures large.

Distribution.—Cenomanian—Lower Quader: Gamighügel, near Dresden; Kahlebusch, near Dohna, Saxony.

Discocavea longiradiata, n.sp.

Diagnosis.—Zoarium large, thin, circular. Zoecia very numerous and apertures occurring in many (about forty) long rays, which each contain from about ten to sixteen apertures. No selvage. Inter-radii very narrow.

Distribution.—Lower Chalk: Southeram Pit, near Lewes.

BIMULTICAVEA, d'Orbigny, 1853.

(Bry. Crét., p. 982.)

Bimulticavea simonowitschi, nov. nom.

SYNONYMY.

Ceripora stellata, pars, Goldfuss, 1829. Petref. Germ., p. 85, pl. xxxi, fig. 1c (non figs. 1a, b).

Semimulticavea goldfussi (non von Reuss, 1866), Simonowitsch, 1871. Bry. Essen Grüns.: Verh. nat. Ver. preuss. Rheinl., vol. xxviii, pp. 34-6, pl. i, figs. 3a-d.

Diagnosis.—Zoarium large, massive; Goldfuss' type is 45 mm. long by 18 mm. wide, with radial groups up to 6 mm. across. Each group has about eight spindle-shaped raised radial groups with biserial apertures.

Distribution.—Cenomanian—Grünsand: Essen.

TROCHILIOPORA, nov. gen.

Diagnosis.—Radioporidæ with a simple top-shaped or capitate zoarium, composed of a constricted stem and expanded head. Apertures in vertical series on the margin of the head.

Type Species.—*Trochiliopora humei*, n.sp. Upper Chalk: Gravesend.

Trochiliopora humei, n.sp.

Diagnosis.—Zoarium fungiform, composed of a thick disc and stout, blunt stem. The diameter of the stem is nearly half that of the head. The lower end of the stem is longitudinally grooved, with linear pores. In the upper part of the stem the pores are irregularly arranged, and the intervening walls are reticular. Base of stem discoid. The upper surface of the disc is flat; its central portion is large, with numerous irregularly arranged apertures of young zoecia. Margins vertical or well rounded, and marked by radial series of large apertures; there are three to four apertures in each series, and the series are separated by lines of cancelli.

Distribution.—Upper Chalk (zone of *Micraster coranguinum*): Gravesend.

DOMOPORA, d'Orbigny, 1849.

Domopora colligata, n.sp.

Diagnosis.—Zoarium large and irregular; from the upper side it appears tubercular and massive. On a side view it is seen to be composed of numerous columns which are often attached, giving the zoarium a massive aspect like a *Radiopora*. The sub-colonies are distinct and thick. Apertures irregular in the centres of the sub-colonies, but become radial and vertical on the sides. In the lower sub-colonies the regular arrangement of the apertures is obscure, as most of the apertures in the vertical series are covered by the overgrowth of the upper sub-colony.

Distribution.—Lower Greensand: Farringdon, Berkshire.

Domopora vinei, n.sp.

SYNONYMY.

- Domopora polytaxis*?, non (Hag.), Vine, 1885. Cambr. Grnsd. : Proc. Yorks Geol. Soc., vol. ix, p. 21.
 „ „ ? „ Vine, 1889. Further on Cambr. Grnsd., pt. ii :
 „ „ ? „ ibid., vol. xi, pt. ii, pp. 258, 270.
 „ „ ? „ Vine, 1891. Rep. Cret. Polyz. : Rep. Brit. Assoc., 1890, p. 389.

Diagnosis.—Zoarium small, of two or more stems arising from a circular base. The stems are sharply divided by transverse annular constrictions into several segments, which decrease in diameter towards the blunt apex. Apertures in vertical series, containing from two to five in each series. The apertures in the series are in places well raised above the general surface of the stem. Mesopores scarce.

Distribution.—Cambridge Greensand : Cambridge.

Domopora virgulosa, nov. nom.

SYNONYMY.—*Ceripora stellata*, pars, Goldfuss, 1829. Petref. Germ., p. 85, pl. xxx, fig. 12, non pp. 39 and 85, pl. xi, fig. 11 ; pl. xxxi, figs. 1a-c.

Diagnosis.—Zoarium sub-dendroid or tufted ; it grows either in numerous short branches from a broad base, with the branches bifurcating occasionally, or as cylindrical branches, which may either give off above many sub-branches or expand distally into irregular lobes, or the main stem may expand into a thickened body giving off above small cylindrical stems. Sides marked by annular constrictions. The end consists of a group of crowded, irregularly arranged zoecia, surrounded by the radial series, which pass into the vertical marginal series.

Distribution.—England—Upper Greensand : Warminster, and Chute Farm, near Warminster, Wilts. Zone of *Schlenbachia rostrata* ; the Cutting, Black Ven, Charmouth. Foreign—Cenomanian : Essen. Lower Quader : Plauen, Saxony.

Domopora novaki, n.sp.

Diagnosis.—Zoarium usually clavate, with a large lobed head and annular peduncle, tapering towards the base ; but also found massive, with numerous stems rising from a broad encrusting base. Zoarium of many layers, up to about ten in number. Mesopores scarce, about as many or slightly more numerous than the zoecia. Apertures, about six in each vertical series.

Distribution.—Cenomanian—Korycaner Schichten : Kamajk, Zbislav, Kolin, Kank, and Jiné, Bohemia.

Domopora cantiana, n.sp.

Diagnosis.—Zoarium small, of stems which are circular in section and marked by numerous horizontal annular constrictions. The upper segments gradually decrease in diameter, and the zoarium ends in a blunt point. Apertures in short vertical series, including from two to six apertures in a series. Mesopores scanty.

Distribution.—Upper Chalk (zone of *Micraster coranguinum*) : Bromley, Kent. Middle Chalk (zone of *Micraster cortestudinarium*) : Chatham.

IV.—CONTRIBUTION TO THE FAUNA OF THE CHALK ROCK.

By CHARLES P. CHATWIN & THOMAS H. WITHERS.

(PLATE II.)

ALTHOUGH small examples of Ammonites are fairly common in the Chalk Rock (Turonian) of this country, large examples are decidedly rare. The only species of Ammonites as yet recorded from this bed are *Prionocyclus neptuni*, Geinitz, sp., and *Pachydiscus peramplus*, Mantell, sp. The former species is always of a small size and is not at all common, but small examples of the latter species,