10) of the *dilution* of the hydrogen ions, i.e., of the number of liters containing one gram equivalent H^+. As concentration (C_H) is the inverse of dilution (V_H in liters), for pH 7.25 $C_H = 1/V_H = 1/10^{7.25} = 10^{0.75}/10^8 = 10^{0.75} \times 10^{-8} = 5.63 \times 10^{-8}$. A graph such as No. 9 would ordinarily read from left to right in making the above calculation, familiar to those regularly employing logarithms, but by constructing the linear scale to read from right to left, the above calculation can be eliminated and the C_H corresponding to any pH value, or vice versa, can be read directly as follows: For pH 7.25 read off the fractional pH value 0.25 from right to left to get the corresponding number, 0.563 in this case. The H-ion concentration is this number multiplied by 10 to a minus power equal to the integer or whole number of the pH value, e.g., $C_H = 0.563 \times 10^{-7}$ or 5.63×10^{-8}. A pH value in integers alone (e.g., pH 7.0) gives directly a C_H value equal to 10 to the negative integer power (e.g., 10^{-7}).

A 14×18 inch enlargement of the pH conversion chart described can be used with a maximum error of ±0.02 pH unit. It should, therefore, be a valuable aid to biologists, chemists, and students engaged in pH measurements, both as a tool for conversion of routine emf measurements into pH values and as a guide toward a clear conception of the inter-relationships between the electrode systems commonly used in electrometric pH measurements.

ACKNOWLEDGMENT

The writer is indebted to Dr. S. F. Acree of the National Bureau of Standards for suggesting the preparation of such a general purpose pH chart, and to Mr. G. H. Lovins for aid in its design and construction.

PALEONTOLOGY.—*Nomenclatorial notes on fossil and recent Bryozoa.*[1] R. S. Bassler, U. S. National Museum.

Taxonomic studies of the Bryozoa have interested the writer to such an extent that he recently published a bibliographic index of fossil and recent genera, giving the classification, genotypes, principal citations and other information useful to the specialist on this group.[2] Further researches have shown the necessity for additional changes in nomenclature which are recorded in the present paper.

[1] Published with the permission of the Secretary of the Smithsonian Institution. Received January 17, 1936.

[2] Part 67 of the *Fossilium Catalogus, Bryozoa Generum et Genotyporum Index et Bibliographia.* pp. 1–229, 1935.

Order TREPOSTOMATA Ulrich

Family Batostomellidae Ulrich, 1890

Stenoporella, n. gen.

Like *Stenopora* Lonsdale, 1844, save that instead of diaphragms numerous spines project from the walls into the zooecial cavity, and the beaded structure of the walls is nearly obsolete. *Stenophragma* Munro, 1912, has semidiaphragms projecting from one side of the wall only and has regularly beaded wall structure.

Genotype.—*S. romingeri* n. sp. Mississippian of Arkansas.

Stenoporella romingeri, n. sp. Figs. 1–3

Zoarium an explanate mass about 100 mm in diameter and 25 mm at the thickest portion, consisting of several superposed layers of zooecia, with surface smooth and clusters inconspicuous, the zooecia being nearly uniform in size. Zooecia angular, 8 in 2 mm, thick walled, with mesopores practically wanting. Large acanthopores of the type found in *Stenopora* occupy only the junction angles and average 2 to each zooecium. Diaphragms wanting, their place being taken apparently by semidiaphragms, which in this case appear as spines projecting into the zooecial cavity. These spines resemble similar projections in such genera as *Chaetetes* and *Favosites*, but the presence of *Stenopora*-like acanthopores and wall structure seems to justify the reference of the genus to the Bryozoa.

Occurrence.—Found by Dr. Carl Rominger at Cave Creek, Arkansas, in strata said to be of Chester age.

Holotype.—No. 53833, U. S. National Museum.

Order CYCLOSTOMATA Busk

Family Ceramoporidae Ulrich, 1882

Haplotrypa, n. gen.

This new genus is proposed for various parasitic or discoidal species which have the ceramoporoid wall structure, namely of irregularly laminated tissue, but entirely lack the lunarium characteristic of most other genera of the Ceramoporidae. The apertures are direct, and externally bear a resemblance to the trepostomatous genus *Monotrypa* Nicholson, 1879. *Spatiopora* Ulrich, 1882, consisting of thin parasitic expansions with oblique cells and blunt acanthopores, is a related genus.

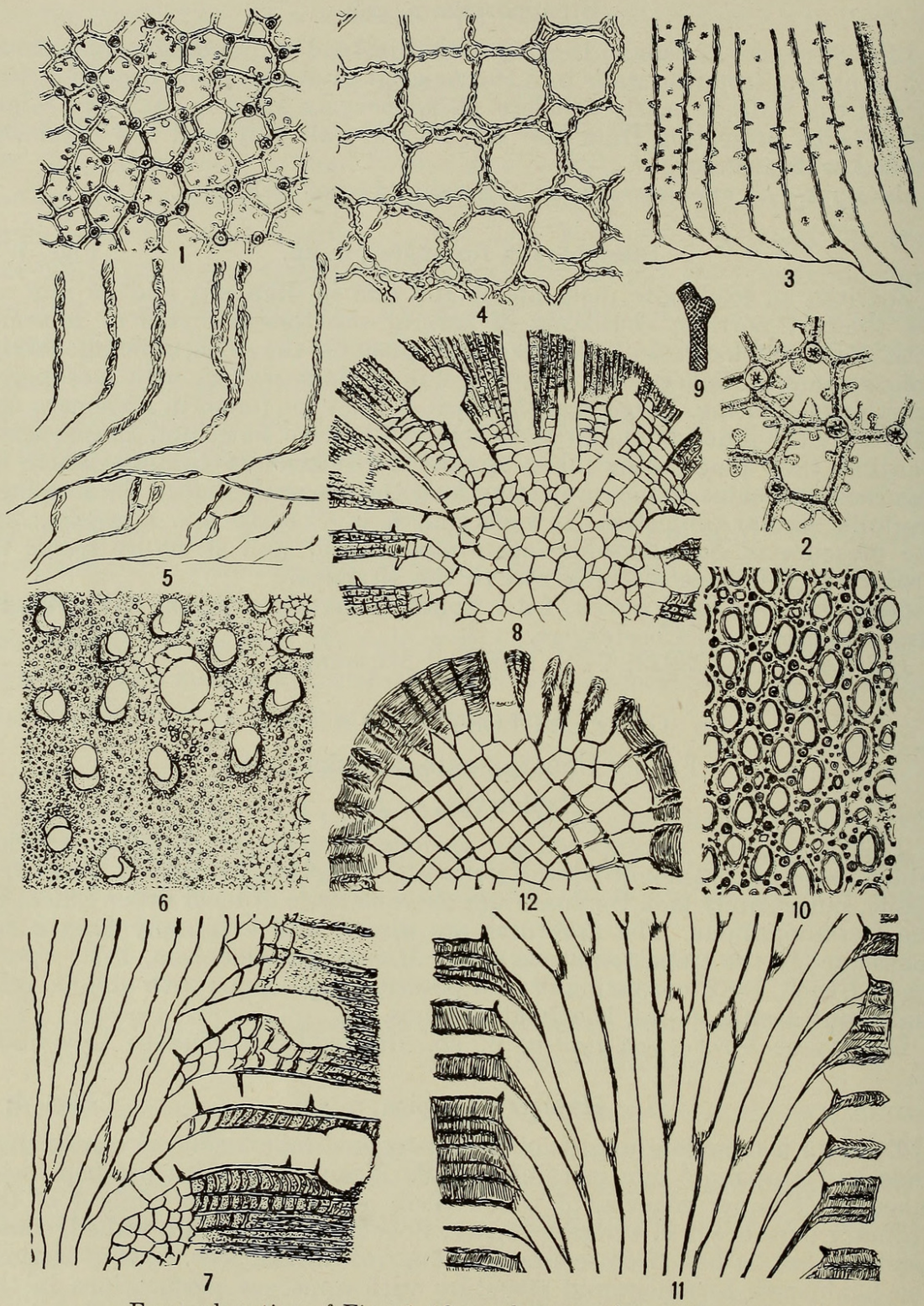
Genotype.—*Haplotrypa typica*, n. sp. Range, Ordovician to Devonian.

Haplotrypa typica, n. sp. Figs. 4, 5

Zoarium a lamellate expansion of superposed layers several centimeters wide and 4 or more mm in thickness. Surface smooth with inconspicuous maculae of larger zooecia, of which there are 3 in 2 mm while 4 of the ordinary ones occur in the same space. Zooecia angular, thin walled, sometimes in contact but often separated by narrow interspaces. In thin sections the laminated, ceramoporoid structure with apparent perforations in the walls is quite evident. Diaphragms are practically absent in both sets of tubes.

Occurrence.—Niagaran group (Osgood), Osgood, Indiana.

Holotype.—No. 92132, U. S. National Museum.



For explanation of Figs. 1–12, see bottom of opposite page.

Order CRYPTOSTOMATA Vine
Family Rhabdomesontidae Vine, 1883

Rhomboporella, n. gen.

Solid, ramose Rhabdomesontidae with the zooecial tubes in the axial region regularly rhombic or quadrate in cross section. Superior hemiseptum and two sets of acanthopores, a large set at the end of the zooecia and a small one entirely surrounding them, well developed.

Genotype.—Rhomboporella typica, n. sp. Carboniferous of Bolivia.

The discovery of this type of structure in the Cryptostomata illustrates an interesting case of parallel development in two different orders of the Bryozoa, as a similar occurrence of rhombic or quadrate zooecia in transverse section is found in the Silurian genus *Rhombotrypa* Ulrich and Bassler 1904, and the Middle Carboniferous *Rhombotrypella* Nikiforova, 1933, belonging to different families of the order Trepostomata. End views of the axial part of the branches in these three genera are so similar as to lead to confusion, but the cryptostomatous characters of the present form are so evident that there can be no thought of close alliance. In each case the similarity is caused by the fact that the zooecia of the immature zone simultaneously at definite intervals develop new tubes and undergo a change in orientation of their sides. This process has been explained in detail by the authors of *Rhombotrypa*,[3] and it will suffice to say here that the rhombic or quadrate cross section is maintained by this concurrent development of new tubes.

Rhomboporella typica, n. sp. Figs. 9–12

Zoarium, a cylindrical, solid, smooth branch, 3 mm in diameter, dividing at intervals. Surface without distinct maculae but with areas of slightly larger zooecia having thicker walls. Zooecia elongate, polygonal, with walls thin to thick according to age, bearing two sets of acanthopores, one of distinctly larger size at the ends of the orifices, and the other of smaller granules ornamenting each wall. Zooecia in irregular quincunx, 6 to 7 in 2 mm measuring along the longer diameter.

Tangential sections reveal the thickened walls, the large and small sets of acanthopores and the few intervening mesopore-like areas. The vertical

[3] Smithsonian Miscellaneous Collections **47**: 44. 1904.

Figs. 1–3.—*Stenoporella romingeri* n. sp. 1, A tangential section through the mature region, ×18, showing the large acanthopores and the semidiaphragms in the form of blunt spines. 2, portion of the same, ×21. 3, vertical section, ×18, exhibiting the aspect of the semidiaphragms in this direction. Chester at Cave Creek, Arkansas.

Figs. 4, 5.—*Haplotrypa typica* n. sp. Tangential and vertical thin sections, ×18, illustrating the ceramoporoid wall structure and the absence of lunaria. Niagaran group (Osgood), Osgood, Indiana.

Figs. 6–8.—*Cliotrypa ramosa* Ulrich and Bassler, n. sp. 6, Tangential section, ×18, near the surface showing the normal zooecia and one of the ovicell-like forms, as well as the granose interspaces. 7, vertical section, ×18, of half of a branch with the ovicell-like expansions and the hemiphragms developed. 8, transverse thin section, ×18. The thin walled immature region and the mature zone with hemiphragms and expanded zooecia, are evident. Mississippian (New Providence shale), King's Mountain, Kentucky.

Figs. 9–12.—*Rhomboporella typica* n. sp. 9, zoarium, natural size. 10, tangential thin section, ×18, through the mature zone. 11, vertical section illustrating the origin of new tubes at regular intervals, and the superior hemiseptum. 12, transverse thin section, ×18, showing the rhombic form of the immature zooecia. Carboniferous of Chulpapampa, Bolivia.

section is with one exception that of a typical member of the Rhabdomesontidae with the superior hemiseptum well developed. The exception, as explained in the generic remarks, is the development of a rather wide immature or axial zone in which the zooecia originate new tubes simultaneously at regular intervals. In vertical fractures of a branch this is shown by alternating smooth and uneven spaces which when cut by the thin section give the aspect exhibited in Fig. 11. Transverse sections are unusually interesting as it is here that the quadrate or rhombic form of the immature zooecia is best exhibited. The end of a branch moistened and viewed under a hand lens shows this character equally well, and gives a ready clue to the species. The large acanthopores originate in the axial region for they are distinctly visible in transverse thin sections.

Occurrence.—Carboniferous of Chulpapampa, Bolivia.

Holotype.— No. 68813, U. S. National Museum.

Family FISTULIPORIDAE Ulrich, 1882

Cliotrypa Ulrich and Bassler, n. gen.

Fistuliporidae like *Fistulocladia* Bassler, 1927, that is, narrow, solid, cylindrical, smooth branches with ovicell-like inflations in the tubes which develop in addition well defined semidiaphragms projecting into the zooecial cavity in the mature region.

This genus originally distinguished and named by Dr. Ulrich and the writer in 1897 when specimens were distributed to various students, was defined by the junior author in the *Paleontology of Timor* **16**: 49, 1929, but remained invalid because the genotype had not been figured. This is herewith corrected with the following description and figures.

Genotype.—*Cliotrypa ramosa* n. sp. Range, Mississippian and Permian.

Cliotrypa ramosa Ulrich and Bassler, n. sp. Figs. 6–8

Zoarium of small, solid, smooth, branching cylindrical stems, 2.5–4 mm in diameter, bearing oval zooecial apertures with strongly marked lunaria, separated by solid, granose interspaces and exhibiting large solid maculae at intervals of about 4 mm. Measuring lengthwise, 4 zooecia occur in 2 mm. In vertical thin sections, the zooecial tubes are thin walled in the solid axial region becoming thick walled in the mature zone and developing at intervals rather thick incomplete plates from alternate sides of the wall as hemiphragms in place of the ordinary diaphragms, and occasionally expanding into spherical, ovicell-like structures which then contract to normal size, or may appear as swollen prominences at the surface. The subsolid interspaces and the maculae are separated by vesicles and towards the surface are traversed by numerous small tubuli.

Occurrence.—Mississippian (New Providence shale), King's Mountain, Kentucky.

Holotype.—No. 92133, U. S. National Museum.

Order CHEILOSTOMATA Busk

The following changes in family, generic, and specific names are suggested in this order.

Family URCEOLIPORIDAE, new name

Proposed in place of Euthyridae Levinsen, 1909, invalid name, since *Euthyris* Hincks, 1882, is preoccupied by the fossil brachiopod genus *Euthyris* Quenstedt, 1869.

Genus **Euthyrisella,** n. gen.

Named in place of *Euthyris* Hincks, 1882, preoccupied by *Euthyris* Quenstedt, 1869.

Genotype.—Euthyris obtecta Hincks, 1882. Recent of North Australia.

Family CHEILOPORINIDAE, new name

The genus *Hippopodina* Levinsen, 1909, was described as possessing an endotoichal ovicell and the family Hippopodinidae was founded by him in 1909, based upon this character. However, the ovicell in the genotype, *Hippopodina feegensis* Busk, 1884, is hyperstomial, and the genera with endozooecial ovicell must be classified otherwise. The new family Cheiloporinidae is, therefore, proposed, based upon *Cheiloporina* Canu and Bassler, 1923, a genus with numerous species, ranging from the Eocene to the Recent. The family Hippopodinidae may be retained for the single type genus or future researches may show it to be related to the Schizoporellidae.

Adeona joloensis, new name

Proposed for *Adeona porosa* Canu and Bassler, 1929, from Jolo, Philippines, preoccupied by *Adeona porosa* Canu and Bassler, 1923, from the Miocene of Santo Domingo.

Escharoides erectoides, new name

Proposed for *Peristomella erecta* Canu and Bassler, 1920, from the Tertiary of South Australia, preoccupied by *Peristomella erecta* Canu and Bassler, 1920, from the Vicksburgian of Alabama, both species now being referred to *Escharoides.*

Callopora horniana, new name

Proposed to replace *Callopora crassospina* Canu and Bassler, 1923, from the Pleistocene of California, preoccupied by *Callopora crassospina* Canu and Bassler, 1920, from the Eocene of North Carolina.

Cellaria elongatoides, new name

Proposed in place of *Cellaria elongata* Canu and Bassler, 1928, from Morocco, preoccupied by *Cellaria elongata* Canu, 1908, from the Patagonian of Argentina.

Floridina voigti, new name

Name proposed for *Floridina bifoliata* Voigt, 1930, from the Danian drift of Anhalt, Germany, preoccupied by *Floridina bifoliata* Canu and Bassler, 1920, a Tertiary species from Mississippi.

Dacryonella minuta, new name

Proposed for *Dacryonella minor* Canu and Bassler, 1920, from the Jacksonian of Florida, preoccupied by *Dacryonella* (*Membranipora*) *minor* Hincks, 1885, a recent species.

Gemelliporina, new genus

Gemellipora Smitt, 1872, by the rules of nomenclature, is a synonym of *Pasythea* Lamouroux, 1871, so that the second group of species typified by *Gemellipora glabra* Smitt, 1872, retained under this name by Canu and Bassler, must be classified elsewhere. The new name *Gemelliporina* is, there-

fore, here proposed for species with keyhole-like aperture, hyperstomial ovicell and tremocyst frontal, with *Gemellipora glabra* Smitt, 1872, a common species of the Gulf of Mexico, as the genotype.

Figularia duvergieri, new name

Proposed for *Figularia carinata* Duvergier, 1924, from the Helvetian of Salles, France, preoccupied by *Figularia (Figulina) carinata* Waters, 1923, a recent species from the East Indies.

To the *Fossilium Catalogus* the following generic citations should be added:

Spirillopora Gürich, 1896. Lower Devonian

Gürich, Verh. d. Russ.-Kais. Mineral, Gesell. zu St. Petersburg, (2) XXXII, p. 213, 1896.

Genotype.—S. anguillula Gürich, 1896, idem, p. 213, pl. X, fig. 17. Poland. Unrecognizable. Figure shows only a twisted stem with cells in spiral rows.

Vetofistula Etheridge, Jr., 1917. Devonian

Etheridge, Jr., Geol. Surv. Queensland, Pub. No. 26, p. 17, 1917.

Genotype.—V. mirabilis Etheridge, Jr., 1917. Not recognizable.

Zeapora Penecke, 1893. Devonian

Penecke, Jahrb. d. kk. geol. Reichsanst. XLIII, p. 610, 1893.

Genotype.—Z. gracilis Penecke, 1893. Alps. Unrecognizable. A trepostome but illustrated by only a poor section.

PALEONTOLOGY.—*A new* Allagecrinus *from Oklahoma.*[1] Edwin Kirk, U. S. Geological Survey.

The U. S. National Museum has recently acquired a number of Pennsylvanian crinoids from Mr. H. L. Strimple of Bartlesville, Oklahoma. Some of them are of considerable biologic and stratigraphic interest, and Mr. Strimple deserves much credit for discovering and calling attention to this material from a hitherto barren field. The most interesting crinoids collected are a suite of *Allagecrinus* preserving the arms. *Allagecrinus* and allied genera have been known for a long time from many parts of the world, and several hundred specimens have been collected. Up to the present, however, none has been found with the arms attached. The species itself proves to be new and is here described as *Allagecrinus strimplei.* Altogether 10 dorsal cups and 18 complete crowns, as well as several sets of dissociated arms, have been available for study.

[1] Published by permission of the Director, U. S. Geological Survey. Received January 29, 1936.