Notice of some new localities of fossil and recent infusoria / by J.W. Bailey.

NOTICE

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OF

SOME NEW LOCALITIES

OF

FOSSIL AND RECENT INFUSORIA.

BY

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FOSSIL AND RECENT INFUSORIA.

THE amount of material for microscopic examination which has been placed in my hands during the past year is so great, that to do full justice to its scientific value would require a large volume with costly engravings, for the preparation of which I have neither time nor means to devote. I must therefore at present content myself with the following brief notices, accompanied by outline sketches of some of the more remarkable forms. Specimens from most of the localities have been sent to Ehrenberg, and the interesting results of his examination of one of the specimens have fortunately been received in time to be incorporated in this article. His observations upon the specimens from the other localities will be published as soon as received.

I. *Fossil Infusoria from the Oregon Territory.*—In examining some specimens of earthy matters from the tertiary formations of Oregon, which were kindly furnished me by James D. Dana, Esq. late of the United States Exploring Expedition, I was greatly pleased to find one mass of what appeared to be fossil fluviatile infusoria. The mass was of a grayish white color, of but little density, and contained the infusorial forms in a state of fine preservation. The total absence of the genera Coscinodiscus, Actinocyclus, Actinoptychus, and others, which are only found in deposits from salt or brackish waters, convinced me that the mass was probably of fluviatile origin. It was then of interest to see how this group of fossil fresh-water forms from northwestern America compared with those of the northeastern parts of the same continent. I have found very few species in common, and these occurred very sparingly in the Oregon specimen. Among these were *Navicula viridis* and *Cocconema cymbiforme*, both common species in this region, but quite rare in the Oregon specimen.

The most remarkable forms from Oregon are the following, for which Ehrenberg's names will soon be furnished.

1. *New genus?* allied to *Terpsinoë?* (See Plate IV, figs. 1, 2, 3, 4, end views, and 5, side view.) This occurs in plates of various degrees of convexity, presenting on the flattened lateral

surfaces a series of marks somewhat like those in Terpsinoë, which Ehrenberg has compared to notes of music. The end view shows considerable variety in the outline, but always presents a series of transverse bars or ribs, which in the most rounded specimens resemble the parallels of latitude drawn upon the map of a hemisphere. Fossil at Oregon; common.

2. *Surirella* ——, *n. sp.?* (Fig. 6.)—This elegant species of Surirella is distinguished by its elliptical outline and the very large ribs or folds of its undulated margin. Fossil at Oregon; rare.

3. *Gallionella* ——, *n. sp.?* (α). (Fig. 7.)—This species of Gallionella is remarkable for the size of its frustules, which greatly exceeds that of any known species of the genus, being often three times larger in diameter than *G. moniliformis*. The outer shell appears to be very minutely and irregularly punctate. The outline of the inner cavity, as seen through the shell, resembles that of a bell-crown hat. The length of a frustule is about equal to its diameter. Fossil at Oregon; common.

4. *Gallionella* ——, *n. sp.?* (β). (Fig. 8.)—This species is much smaller than the preceding, and has the surface of the frustules covered with granules, so arranged as to give longitudinal and transverse lines. The length of a frustule is about equal to its radius. Fossil at Oregon; common.

5. *Gallionella* ——, *n. sp.* (γ). (Fig. 9.)—This species may possibly be a young state of the last, (β); but it appears distinct in its smaller size, and by the length of the individuals being often equal to their diameter. The granules present longitudinal and transverse rows, as in the preceding species. Fossil at Oregon; common.

Besides the above forms, there were also detected spiculæ of Spongillæ, a few minute species of Navicula, Cocconeis, &c.

Although I have little doubt that the above forms are new, I waive the right of naming them myself, in order that they may be examined by Ehrenberg, compared by him to the forms of other regions, and finally introduced into science by his undoubted authority.

With regard to the geological position of the above fossils, I can only state that the specimen in which I detected them was labelled by Mr. Dana as coming from the "Tertiary of Oregon," and that a considerable mass of the same earth is placed with

this label among the geological specimens brought home by the Exploring Expedition. The other specimens which accompanied it, contained marine shells. It is therefore probable that the tertiary of Oregon may, like that of Europe, contain alternations of fluviatile and marine deposits which have never been detected in the tertiary formations of the eastern portions of the United States. That the deposit in question is an ancient one, and possibly of extinct species, is rendered probable by the fact that none of the species agree with the recent infusoria found by myself entangled in a mass of Confervæ attached to a Unio from Fort George, Columbia River, neither do they agree with any of the recent fresh-water forms figured by Ehrenberg as coming from any part of North America. The recent forms on the Unio from Columbia River much resembled those from the eastern portions of the United States, and among them were the following.

Gomphonema minutissimum, *Gallionella aurichalcea*, *Eunotia Westermanni*, *Synedra ulna*, *Cocconema cymbiforme*, one species of *Fragillaria*, a minute *Cocconeis*, and a few spiculæ of *Spongilla*.

II. *Fossil Infusoria from the Bermuda Islands.*—Some months ago I received from M. Tuomey, Esq. of Petersburg, Va. a fine specimen of infusorial earth, labelled "*Tripoli from Bermuda*," which he requested me to examine, and to inform him if the forms which it contained were known to microscopic observers. The only information with regard to the history of the specimen, which I have yet been able to obtain is, that Mr. Tuomey received it with its present label from some mineralogical correspondent, and that he has no doubt that it came from Bermuda. The belief that this is the true locality is confirmed by the examination of the specimen itself, which presents such a group of microscopic forms as might be expected to occur at Bermuda—numerous decidedly American forms being mingled with others which have never before been detected at any locality.

Finding that this matter was uncommonly rich, and a perfect mine of beautiful *nondescript* forms, I determined at once to place it in the hands of Ehrenberg, as the *only* person now qualified to compare the species with those of all other parts of the world, and to decide upon their novelty. I accordingly transmitted to him a good supply of the earth from Bermuda, accompanied by outline sketches of some of the forms which appeared

to me to be most novel and interesting; and requested him to name and describe the species. This request he has kindly complied with, and in a letter dated Berlin, Aug. 10, 1844, he has furnished me the names for the forms whose outlines I had sent him, and also with the monthly report of the Berlin Academy for June, 1844, which contains a list of 138 species, which he has detected in the Bermuda Tripoli, together with short descriptions of 9 new genera and 58 new species.

It is but justice to Ehrenberg to state, that he has given me ample credit for every fact, however unimportant, with which I have furnished him.

From Ehrenberg's report and letter above mentioned, and the reference he makes to drawings of which I retained duplicates, I have been able to identify most of the forms which he describes, many of which are so remarkable that I believe the following notice of them, accompanied by sketches of my own, showing the most important generic characters, will not be unacceptable to naturalists. I have also included the characters of some new genera founded by Ehrenberg on forms previously included under groups from which they are now very properly separated. Many of these forms are of American type, and therefore a knowledge of them will be useful to students of our fossil infusoria.

1. "Craspedodiscus, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex æqualiter bivalvis silicea orbicularis non concatenata, superficie cellulosa, præter cellularum radiantem ordinem, non radiata nec septata, sed margine structuræ diversæ tumido solubilique late prætexta."

The forms of this beautiful genus resemble Coscinodisci surrounded by a distinct tumid margin of cells much larger than those upon the disc.

A portion of *Craspedodiscus elegans* from Bermuda is shown in fig. D. To the same genus is now referred the *Pyxidicula Coscinodiscus*, Ehr. which occurs fossil in Virginia.

2. "Heliopelta, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex æqualiter bivalvis silicea orbicularis (non concatenata?) intus sepimentis imperfectis in loculos radiantes extus alterne impressos divisa, centro lævi anguloso, aperturis sub margine tot quot radii adsunt magnis, spinulis in utroque latere sub margine crebris erectis oppositis."

These truly elegant forms have the habit of Actinoptychus, but in addition they have near the margin a row of lateral spines, (somewhat like the processes of Eupodiscus, but far more numerous,) which probably connect the animalcules together in the young state. By a happy idea, Ehrenberg has dedicated the different species of this genus (which must always be a favorite among lovers of the microscope) to persons distinguished in the history of microscopic research. The species with *six* radiant septæ and *three* elevated radiant portions, is named *Heliopelta Metii*, after Jacob Metius, to whom Ehrenberg ascribes the discovery of the microscope in 1606. The species with *eight* septæ and *four* elevated portions, represented in fig. A, is called *H. Leeuwenhoekii*, in honor of Leeuwenhoek, who discovered animalcules in 1675. To Euler, for his researches upon achromatism in 1757, is given the species *H. Euleri*, with *ten* septæ and *five* elevations. To Selligue, for improvements in the structure of the microscope in 1823, is given the species *H. Selligueii*, with *twelve* septæ and *six* elevations. And Ehrenberg suggests that new species may hereafter be dedicated to Dollond for his achromatic inventions, and to Otto Müller for his microscopic researches. It is to be hoped that some species worthy of bearing the name of the greatest microscopic observer of the present age may be added to this list, as *H. Ehrenbergii.*

The different species of Heliopelta are very abundant in the Bermuda Tripoli, and have not yet been noticed at any other locality.

3. "Omphalopelta, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex æqualiter bivalvis silicea orbicularis (non concatenata?) intus sepimentis imperfectis in loculos radiantes extus alterne impressos divisa, centro lævi, aperturis obsoletis, spinulis in utriusque lateris summo margine raris erectis oppositis."

This genus has the habit of Actinoptychus and Heliopelta, but differs from the former in the presence of lateral spines, and from the latter by the small number of these processes. The species of these three genera often closely agree in their form as well as in the number of their radii and cells, but the character of the spines will always distinguish them.

4. "Systephania, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex æqualiter bivalvis silicea orbicularis (concatenata?) ,Valvularum testa cellulosa nec radiata nec septata, corona

spinularum aut membranacea erecta externa in ipso cujusvis valvulæ disco, (nec in ipso margine.)"

This genus has the habit of *Coscinodiscus lineatus*, but with lateral crowns, which in the young state connect two individuals.

5. "SCEPTRONEIS, *nov. gen.*—Animal e Bacillariis Echinelleis? affixum? Lorica simplex æqualiter bivalvis silicea stiliformis compressa, non concatenata, cuneata, (viva facile pedicellata.) Sutura laterum utriusque valvæ longitudinalis media, umbilicus nullus."

The only species, *Sceptroneis Caduceus*, is represented in fig. 11. It resembles a Gomphonema, but wants the lateral umbilicus. In the fossil state it is impossible to decide whether it was fixed to a pedicel when living. It occurs in myriads in the Bermuda Tripoli.

6. DICTYOPYXIS, *nov. subgen.*—This subgenus is formed to include those species of the old genus Pyxidicula which have a cellular surface. Pl. II, fig. 2, in Vol. XLII, of this Journal, represents a species from Richmond, Va. now called *Dictyopyxis cruciata.*

7. "MASTOGONIA, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex (inæqualiter) bivalvis, non concatenata, valvis siliceis angulosis mammiformibus, basi orbiculari, umbilico inermi. Valvularum membrana continua integerrima nec cellulosa, angulis radiantibus."

These forms, which were formerly placed in the genus Pyxidicula, may be recognized by having an orbicular base, connected on each side by radiant lines, with an unarmed central and elevated umbilicus, and by having a smooth surface. To this genus is now referred (without change of specific names) the two species *Pyxidicula Oculus-Chamæleontis* and *P. Actinoptychus*, Ehr. from Virginia. A species, *Mastogonia heptagonæ*, Ehr. is represented in fig. 12. The number of radiant lines in this genus varies very much, and Ehrenberg states that it is sometimes different on the two sides of the same individual.

8. STEPHANOGONIA, *nov. gen.*—This genus has the characters of Mastogonia, but in addition has also a row of projecting spines around the umbilicus. Ehrenberg describes two species, the first, *S. quadrangula*, discovered by himself, and the second, *S. polygona*, founded on an outline sketch which I sent him of a form noticed by myself in the Bermuda Tripoli. This is represented in fig. 13.

9. Stephanopyxis, *nov. subgen.*—This group includes those Pyxidiculæ which have turgid bivalve forms with a cellular surface, bearing in the middle of the valves a crown of small teeth, prickles, or a membrane. *Pyxidicula aculeata* is an example.

10. Xanthiopyxis, *nov. subgen.*—These forms are Pyxidiculæ with bristles, setæ, or wings. They have the habit of Xanthidium and Chætotyphla, but are bivalved and siliceous. *Xanthiopyxis oblonga* is shown in fig. 14; a similar form occurs at Piscataway, Md.

11. "Hercotheca, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex inæqualiter bivalvis silicea turgida, valvularum membrana continua nec cellulosa, sub cute, utplurimum nervosa, aut sub setis liberis cutis locum tenentibus permanentibusque dividua. Hinc corpuscula in volvularum singularum contiguo summo margine setis aut membranis oppositis coronata et involuta tanquam obvallata apparent.

"Hæ formæ Gallionellarum more silicea sed non decidua sub cute sponte dividuntur."

One species only is described by Ehrenberg. The characters are these:

"*H. mammillaris*, testulæ valvulis lævibus basi media setis oppositis simplicibus fere 20, mammillas superantibus ipsi margini insertis obvallata. Diameter, $\frac{1}{68}'''$. Bermuda."

12. "Periptera, *nov. gen.*—Animal e Bacillariis Naviculaceis liberum. Lorica simplex inæqualiter bivalvis silicea compressa. Valvularum testa simplex continua, nec cellulosa. Una valvula turgida nuda, altera alata aut cornuta, cornibus interdum ramosis extremo margini affixis."

The forms of this genus are allied to those of the genera Rhizosolenia and Dicladia, but Rhizosolenia has one central horn, and Dicladia has two, which are also near the centre. Hercotheca differs by the turgid uncompressed form. To the genus Periptera are now referred (without change of specific names) the fossil forms from Virginia, which were described as *Dicladia Capra* and *D. Cervus*, Ehr. I presume that the forms represented in figs. 15, 16, and 17, which I have found frequently in the Bermuda Tripoli, are species of Periptera.

Besides the above genera, Ehrenberg also describes many novel *species* from Bermuda belonging to genera previously known; among the most remarkable of which are the following; to Eh-

renberg's descriptions of which I have added a few remarks, with references to outline sketches drawn by myself.

1. "*Chætoceros? Bacillaria.* (Fig. 18.)—Testula Bacillari ter quaterve latiore quam alta in utroque fine truncata et cornibus duobus mediis longis filiformibus instructa. Diam. $\frac{1}{72}'''$? Bermuda." *Ehr. l. c. p.* 18.

2. "*Chætoceros? Diploneis.* (Fig. 19.)—Testula media constricta utroque fine rotundato, habitu Diploneidis cornibus filiformibus in utroque fine mediis. Diam. $\frac{1}{80}'''$ sine cornibus. Bermuda.

"Utramque formam Prof. Bailey primus observavit et delineavit. *Ch. Bacillarium* ipse non vidi, altera in comissa terra mihi quoque obviam facta est. Chætocerotes e mari australi petiti æque lati ac longi, aut longiores quam lati sunt et catenatim vivunt, cornibus decies et ultra longioribus." *Ehr. l. c. p.* 18.

I now feel confident that these two supposed species are only different positions of the same species. I have seen as many as 15 to 20 individuals in the Bermuda Tripoli, and have sometimes succeeded, by means of Chevalier's compresser, in turning them over so as to observe the two sides of the same individual, and have thus ascertained that these two sides differ in outline, as shown in figs. 18 and 19, and I would therefore retain for the species the name *C. Diploneis.*

3. "*Denticella? polymera.* (Fig. 20.)—Testulæ latissimæ brevisque septis lobisque lateralibus in adultu 10 (–12), granulis in lobi medii facie anteriore 6 majoribus stellam formantibus (denticulis setaceis lateralibus extra medium positis) aperturarum tubulis longe exsertis. Latit. $\frac{1}{11}'''$. Bermuda.

"Fragmentum vidi setis expers, hinc Biddulphiæ generi hanc formam adscripsissem, sed Prof. Bailey in icone missa unius lateris setam delineavit. *Denticellæ tridentatæ* statum eximie adultum hanc formam referre non censeo quoniam lobi novæ majorisque formæ depressiores sunt. Lobos 10 ipse observavi 12 Bailey delineavit." *Ehr. l. c. p.* 19.

This form appears to be rather rare; a copy of the outline which I sent to Ehrenberg is given in fig. 20.

4. "*Dictyocha Ponticulus.* (Fig. 21.)—Lanceolata oblonga, arcu medio transverso simplici in duas cellulas divisa margine inermi. Diam. $\frac{1}{36}'''$. Bermuda.

5. "*Dictyocha Quadratum.* (Fig. 22.)—Quadrata aut subquadrata oblonga, arcu medio transverso simplici in duas cellulas divisa spina in utroque latere angustiore medio singula. Diam. $\frac{1}{40}'''$. Bermuda.

"Has duas formas Prof. Bailey primus observavit et delineatus misit. Multa specimina ipse vidi." *Ehr. l. c. p.* 19–20.

These well characterized species are very abundant in the Bermuda Tripoli, but have not been detected at any other locality.

6. "*Triceratium Solenoceros.* (Fig. 23.)—Testulæ lateribus profunde concavis, apicibus longe tubulosis radiatis subacutis superficie granulorum seriebus radiantibus rectis ornata, granulis in $\frac{1}{100}$ lineæ 15. Diam. $\frac{1}{23}'''$. Bermuda.

"Prof. Bailey hujus iconem circumscriptam misit. Nonnulla specimina ipse inveni." *Ehr. l. c. p.* 26.

This remarkable species is easily recognized by the excessively elongated angular processes.

7. "*Zygoceros? Bipons.* (Fig. 24.)—Testula a latere lanceolata utroque apice acuto et corniculo admodum parvo instructo, stricturis mediis lævibus duabus, superficie subtiliter granulata nec radiata. Diam. $\frac{1}{32}'''$. Bermuda." *Ehr. l. c. p.* 26.

The true nature of this form is unknown. It is quite common in the Bermuda earth.

For an account of many other interesting forms from Bermuda, I must refer to Ehrenberg's own memoir. A list of all the species noticed by Ehrenberg is given in the table on pages 331–335, by which it will be seen that this remarkable infusorial deposit agrees with those of Virginia and Maryland in containing many species, such as *Eupodiscus Rogersii*, *Goniothecium Odontella*, various species of *Rhizosolenia*, *Dicladia*, &c. which have hitherto been considered as exclusively American forms. It is also remarkable that the Bermuda specimen, like all those from Virginia, contains no trace of calcareous Polythalamia, although I have found these to be very abundant in specimens of recent sands and limestones of the Bermuda Islands.

The occurrence of this remarkable infusorial formation at Bermuda is of much interest, as it shows that such formations are not confined to the harbors and estuaries of a continent, but may also occur on the "still vexed" shores of the lone isles of the ocean.

It is also remarkable that a deposit so purely siliceous could be formed among the coralline isles of Bermuda. No mention of any such "Tripoli" is contained in any of the accounts of the geology of those islands which I have yet seen. It is therefore

very desirable that any one possessed of facts connected with so interesting a locality should publish them as soon as possible.

III. *Fossil Infusoria of Virginia and Maryland.*—I have recently been furnished by Prof. W. B. Rogers with interesting specimens of fossil infusoria from several new localities discovered by himself in Virginia, viz. at Rappahannock Cliffs, Stratford Cliffs, Brown's Mills, Westmoreland Court House, and Meherrin River. I am also indebted to Mr. Tuomey for a large collection of infusorial specimens from the localities discovered by himself in the neighborhood of Petersburg; and specimens from Hollis Cliffs, Va. have been given to me by Mr. Tuomey, by Prof. Rogers, and by Francis Markoe, Esq., but I have not been informed who was the discoverer of this locality.

In order to show in a connected manner the results of the examinations hitherto made upon the infusorial remains in the tertiary of Virginia and Maryland, I present the following table, which also includes a list of the species found by Ehrenberg in the Tripoli of Bermuda. The first four columns are on the authority of Ehrenberg; the others are the results of my own observations, and are very far from being complete, as many of Ehrenberg's species are still unknown to me. I have carefully refrained from including in the lists any form of whose true name I felt any doubt. As specimens from all these localities have been sent by me to Ehrenberg, we may shortly be able on his authority to give much more complete lists.

In this table a (*) placed opposite to a species, shows that it occurs at the locality whose name is placed above the star. If a (†) is placed to the left of a specific name, it indicates that the species is, according to Ehrenberg, known in the recent as well as in the fossil state. Where I have observed a species which is omitted by Ehrenberg in his lists for the first four localities, I have added a B to the star.

Where the name of the discoverer of a locality is known to me, I have added it to the name of the place.

TABLE *showing the species of Infusoria, Phytolitharia, &c. found Fossil at Bermuda, and at various localities in the Tertiary of Virginia and Maryland.*

	Bermuda: specimens received from M. Tuomey, Esq.	Richmond, Va.: discovered by Prof. W. B. Rogers.	Petersburg, Va.: discovered by M. Tuomey, Esq.	Piscataway, Md.: discovered by Prof. W. B. Rogers.	Rappahannock Cliffs, Va.: discovered by Prof. W. B. Rogers.	Stratford Cliffs: discovered by Prof. W. B. Rogers.	Brown's Mills, Westmoreland C. H.: discovered by Prof. W. B. Rogers.	Hollis Cliffs, Va.: discovered by ——?	Meherrin River, Va.: discovered by Prof. W. B. Rogers.	Fossil species which have also been found in a recent state on the coast of U. States by Prof. J. W. Bailey.
Actiniscus †Pentasterias,	*	*		*		*		*		*
†Sirius,		*								
Tetrasterias,		*								
Actinocyclus †quinarius,	*	*		*					*	
†biternarius,	*	*		*					*	
†septenarius,	*	*	*	*					*	
†octonarius,	*	*	*	*		*				
†nonarius,	*	*	*	*				*		
†denarius,	*	*	*	*						
†undenarius,	*	*	*	*						
†bisenarius,	*	*	*	*						*
†tredenarius,	*	*	*	*						
biseptenarius,	*	*	*	*						
†quindenarius,	*	*		*						
†bioctonarius,	*	*								
septemdenarius,	*	*					*			
binonarius,	*	*								*
novemdenarius,	*	*								
vicenarius,	*	*								
Luna,	*	*								
Ceres,	*	*			*			*	*	
Juno,	*	*								
Jupiter,	*	*								
Mars,	*	*								
Mercurius,	*									
Pallas,	*									
Saturnus,	*									
Terra,	*									
Venus,	*									
Uranus,	*									
Aquila,	*									
Bet-el-gose,	*									
Canopus,	*									
Actinoptychus quaternarius,		*	*							
†senarius,	*	*	*	*	*	*	*	*	*	*
biternarius,	*	*	*	*						
velatus,	*									
†octonarius,		*	*	*		*				
nonarius,			*							
†denarius,		*	*	*			*		*	
†duodenarius,		*	*			*			*	*
†quatuordenarius,		*	*						*	
†sedenarius,		*	*							
†octodenarius,		*	*							
vicenarius,		*							*	
Ceres,		*								
Jupiter,		*						*	*	

TABLE CONTINUED.

	Bermuda: specimens received from M. Tuomey, Esq.	Richmond, Va.: discovered by Prof. W. B. Rogers.	Petersburg, Va.: discovered by M. Tuomey, Esq.	Piscataway, Md.: discovered by Prof. W. B. Rogers.	Rappahannock Cliffs, Va.: discovered by Prof. W. B. Rogers.	Stratford Cliffs: discovered by Prof. W. B. Rogers.	Brown's Mills, Westmoreland C. H.: discovered by Prof. W. B. Rogers.	Hollis Cliffs, Va.: discovered by ?	Meherrin River, Va.: discovered by Prof. W. B. Rogers.	Fossil species which have also been found in a recent state on the coast of U. States by Prof. J. W. Bailey.
Anaulus? Campylodiscus,	*									
Asterolampra Marylandica,				*						
Aulacodiscus Crux,	*	*	*							
Biddulphia tridentata,	*	*	*	*						
?lunata,		*								
Gigas,	*									
Campylodiscus Clypeus,	*									
Chætoceros Diploneis,	*									
Chætotyphla Pyritæ?			*							
Coscinodiscus asteromphalus,		*								
apiculatus,		*			*	*	*			*
†centralis,		*								
concavus,		*								
†disciger,			*							
†excentricus,	*	*	*							*
gemmifer,	*									
Gigas,		*		*						
heteroporus,	*									
†lineatus,		*	*	*	*					*
†marginatus,		*	*	*	*	*	*			*
†minor,		*								
Oculus-Iridis,		*	*	*		*	*	*	*	*
Omphalanthus,	*									
perforatus,	*	*		*B						
†radiolatus,	*	*	*	*	*	*				*
†subtilis,	*	*	*							
velatus,		*								
Craspedodiscus elegans,	*									
Coscinodiscus,		*	*		*	*		*		
Denticella polymera,	*									
Rhombus,			*			*	*	*	*	
tridentata,	*		*	*		*	*	*	*	
tumida,	*									
Dicladia Capreolus,		*	*							
clathrata,	*									
Dictyocha †aculeata,			*							*
†Crux,	*	*	*	*						
Epiodon,		*		*						
†Fibula, α	*	*		*	*	*	*	*	*	*
Fibula, β				*	*	*	*	*	*	*
hemisphærica,	*									
Ponticulus,	*									
Quadratum,	*									
†Speculum,		*			*				*	*
Staurodon,		*								
†triactis (triacantha),	*			*		*	*	*		
ubera,				*						
Discoplea Actinocyclus,	*									
Americana,			*	*B	*	*			*	

TABLE CONTINUED.

	Bermuda: specimens received from M. Tuomey, Esq.	Richmond, Va.: discovered by Prof. W. B. Rogers.	Petersburg, Va.: discovered by M. Tuomey, Esq.	Piscataway, Md.: discovered by Prof. W. B. Rogers.	Rappahannock Cliffs, Va.: discovered by Prof. W. B. Rogers.	Stratford Cliffs: discovered by Prof. W. B. Rogers.	Brown's Mills, Westmoreland C. H.: discovered by Prof. W. B. Rogers.	Hollis Cliffs, Va.: discovered by ——?	Meherrin River, Va.: discovered by Prof. W. B. Rogers.	Fossil species which have also been found in a recent state on the coast of U. States by Prof. J. W. Bailey.
Discoplea denticulata,	*									
undata,	*									
Eunotia †Diodon,		*								
†Monodon?		*								
†gibba,		*								
Eupodiscus †Germanicus,	*	*	*	*	*					
quaternarius,	*									*
quinarius,	*									
†Rogersii,	*B		*	*B	*	*	*	*	*	*
†Baileyi,			*							
Flustrella concentrica,	*			*						
Fragillaria amphiceros,		*								
lævis,		*								
leptoceros,		*								
†pinnata,		*								
Gallionella †sulcata,	*	*	*	*	*	*	*	*	*	*
Gomphonema †clavatum,		*								
†minutissimum,		*								
Goniothecium didymum,		*								
Gastridium,		*								
hispidum,			*							
Monodon,	*		*	*						
Navicula,	*	*								
obtusum,		*								
Odontella,	*	*	*	*	*			*		
Rogersii,	*	*								
Grammatophora †Africana,		*	?							
†angulosa,		*								
†oceanica,		*	*B							*
†parallela,		*								
†stricta,	*									*
†undulata,		*								
Haliomma Amphisiphon,	*									
Æquorea?		*		*						
crenatum,		*								
nobile,	*									
Heliopelta Leeuwenhoekii,	*									
Metii,	*									
Euleri,	*									
Selligueii,	*									
Hercotheca mammilaris,	*									
Lithobotrys quadriloba,			*	*						
Lithocampe aculeata,	*									
antartica,	*									
Radicula?				*	*	*		*		
solitaria,				*						
Mastogonia Actinoptychus,	*	*	*	*	*					
Crux,	*									
heptagona,	*									

TABLE CONTINUED.

	Bermuda: specimens received from M. Tuomey, Esq.	Richmond, Va.: discovered by Prof. W. B. Rogers.	Petersburg, Va.: discovered by M. Tuomey, Esq.	Piscataway, Md.: discovered by Prof. W. B. Rogers.	Rappahannock Cliffs, Va.: discovered by Prof. W. B. Rogers.	Stratford Cliffs: discovered by Prof. W. B. Rogers.	Brown's Mills, Westmoreland C. H.: discovered by Prof. W. B. Rogers.	Hollis Cliffs, Va.: discovered by ——?	Meherrin River, Va.: discovered by Prof. W. B. Rogers.	Fossil species which have also been found in a recent state on the coast of U. States by Prof. J. W. Bailey.
Mastogonia Oculus-Chamæleontis,	*			*	*					
quinaria,	*									
Rota,	*				*		*			
sexangula,	*									
Mæsocena Diodon,				*						
elliptica,	*			*						
triangula,	*			*	*					
Navicula omphalia,	*									
†Sigma,		*			*				*	*
Omphalopelta areolata,	*					*				
cellulosa,	*				*		*			
punctata,	*									
versicolor,	*									
Periptera Capra,		*								
Cervus,				*			*			
Chlamidophora,	*									
Tetracladia,	*									
Pinnularia Entomon,	*									
(*Diploneis*) †didyma,	*	*	*	*	*		*	*		*
diomphala,		*	*							
(*Mononeis*) †peregrina,		*	*		*	*	*	*	*	*
†viridis,		*								
Pyxidicula areolata,			*							
apiculata [Systephania? B.]			*							
(*Dictyopyxis*) cruciata,	*		*	*	*	*	*	*	*	
" Cylindrus,				*						
" hellenica,	*			*						
" Lens,		*								
" (? B.) Actinocyclus,		*								
" Gemmifera,				*	*	*	*	*		
" cristata,		*								
" limbata,				*						
(*Stephanopyxis*) aculeata,	*	*	*	*		*	*			
(*Xanthiopyxis*) alata,	*									
" constricta,	*	*								
" (? B.) hirsuta,				*	*					
" globosa,	*									
" oblonga,	*				*					
Rhaphoneis †Amphiceros,		*	*	*						
Fusus,	*		*							
gemmifera,				*	*					
Leptoceros,		*	*							
pretiosa,				*						
†Rhombus,		*	*		*		*	*		*
scalaris,	*									
Rhizosolenia Americana,		*	*	?	*	*		*		
?barbata,	*									
Calyptra,	*									
Campana,	*									

TABLE CONTINUED.

	Bermuda: specimens received from M. Tuomey, Esq.	Richmond, Va.: discovered by Prof. W. B. Rogers.	Petersburg, Va.: discovered by M. Tuomey, Esq.	Piscataway, Md.: discovered by Prof. W. B. Rogers.	Rappahannock Cliffs, Va.: discovered by Prof. W. B. Rogers.	Stratford Cliffs: discovered by Prof. W. B. Rogers.	Brown's Mills, Westmoreland C. H.: discovered by Prof. W. B. Rogers.	Hollis Cliffs, Va.: discovered by ——?	Meherrin River, Va.: discovered by Prof. W. B. Rogers.	Fossil species which have also been found in a recent state on the coast of U. States by Prof. J. W. Bailey.
Rhizosolenia Pileolus,		*	*							
Ornithoglossa,	*									
Sceptroneis Caduceus,	*									
Stauroneis Sigma,		*								
Stephanogonia quadrangula,	*									
polygona,	*									
Symbolophora Trinitatis,				*						
Synedra Linea,		*								
Ulna,		*								
?incurva,	*									
Systephania aculeata,	*									
Corona,	*									
Diadema,	*									
Tetrachæta ——? (Triceratium spinosum, B.)			*							
Triceratium amblyoceros,	*	*		*B	*		*	*		
acutum,	*									
condecorum,	*									
obtusum,	*	*	*		*					
Pileus,			*							
†Reticulum,	*	*	*	*	*		*	*	*	*
Solenoceros,	*									
undulatum,	*									
Zygoceros †Rhombus,			*							*
Bipons,	*				*					
stiliger,	*									
PHYTOLITHARIA.										
Amphidiscus †clavatus,			*							
Lithasteriscus †radiatus,		*		*						
†reniformis,				*						
tuberculosus,	*	*		*	*	*	*			*
†amphiodon,			*							
Lithodontium furcatum,	*									
†Clepsammidium,		*	*							
Amphidon,	*									
Serra,	*									
Spongiolites †acicularis,		*		*					*	*
appendiculata,		*								
†aspera,		*								*
Caput-Serpentis,	*	*								
†cenocephala,	*	*			*	*	*		*	*
†Clavus,		*	*	*			*	*		
collaris,		*		*						
†foraminosa,	*	*			*	*				
†Fustis,		*	*	*	*					*
uncinata,				*					*	
unguiculata,		*								

Among the forms which occur at some of the localities above mentioned, and which I have not been able to identify with any of those described by Ehrenberg, are the following:

1. *Biddulphia* ——, *n. sp.?* (Fig. 24, 24*a*.)—This is somewhat allied in form to *Denticella tridentata*, but I have never seen any lateral setæ upon it. It may be recognized by the curves at the base of the lines of constriction of the lorica. It occurs sparingly at Rappahannock Cliffs, and is more abundant at Brown's Mills, Va.

2. *Triceratium* ——, *n. sp.?* (Fig. 25.)—This species has each of its angles subtended by an arc of the circle, so as to form with the sides a somewhat hexagonal figure in the middle of the triangular faces. It occurs fossil at Meherrin River, and recent at Charleston, S. C.

3. *Goniothecium?* ——. (Fig. 26.)—These forms consist of elliptical shield-shaped plates, with a large elevated umbone surrounded by a narrow margin. They occur at Bermuda, Rappahannock Cliffs, Brown's Mills, &c.

4. *Lithocampe* ——. (Fig. 27.)—This remarkably perfect specimen of Lithocampe was found by me in the infusorial earth from Piscataway, Md.

There are also several species of Rhaphoneis occurring at most of the localities, which I cannot determine positively; one of the most remarkable occurs abundantly at Rappahannock Cliffs, and has very elongated rounded terminations, greatly resembling the upper end of *Sceptroneis Caduceus*, (fig. 11.)

A species of Stauroptera from the locality at Meherrin River is shown in fig. 28. It has not been found fossil at any other locality.

The following are offered as some of the general conclusions drawn from the observations above recorded.

1. The species at all the above mentioned localities are exclusively marine.

2. The different localities have many species in common, the number of which will doubtless be increased by further observation.

3. The species which appear to have been most extensively diffused in the seas from which the fossil deposits were made, are the very species which in the recent state appear to be cosmopolites; as for example, *Actiniscus Pentasterias*, *Actinoptychus senarius*, *Coscinodiscus apiculatus*, *C. marginatus*, *C. lineatus*,

Dictyocha Fibula, *Gallionella sulcata*, *Rhaphoneis Rhombus*, *Triceratium Reticulum*, &c.

4. There are a great number of *fossil* species at these localities, which, although very easy to be recognized, have *never* been found in a *recent* state, and are therefore probably *extinct.*

5. On the other hand there are numerous well characterized *recent* species which are every where present in the deposits of our present seas, which have *never* been found in the *fossil* state, although they are so large and well marked that it would be impossible to overlook them if they were present. Among these may be mentioned *Biddulphia pulchella*, *Isthmia obliquata*, *Triceratium favus*, *Gallionella moniliformis*, *Tessella catena*, *Achnanthes brevipes*, *Cocconeis oceanica*, &c. These are therefore probably of recent creation.

6. It hence appears that the same successive extinction of some species and creation of others, which has taken place with regard to the larger tribes of organic beings, has also occurred with the most minute races.

7. The specimens from all the above localities agree in the total absence of the calcareous-shelled Polythalamia, although these calcareous forms are very abundant in the associated beds in which the shells of mollusks are found in an undecomposed state.

IV. *Recent Infusoria in the Blue Mud of New Haven Harbor.*—This mud, which is used I believe as a fertilizer, was recently analyzed by B. Silliman, Jr. and the following results obtained.

Silica, ...	58·633
Alumina, ...	30·563
Oxide of iron, ...	6·186
Carbonate of lime, ...	4·263
Magnesia, ...	0·705
	100·348

Some of the same mud was given me by Mr. Silliman, with the request to examine it by the microscope. The contents which I found were as follows—viz. particles of quartz, hornblende, and feldspar, mingled with great numbers of siliceous infusoria, among which were noticed *Actinocyclus senarius*, *Coscinodiscus excentricus*, *C. oculus-iridis*, *Cocconeis oceanica*, *Dictyocha speculum*, *D. Fibula*, *Dicladia* ——*?* *Eunotia Westermanni*, *Gallionella sulcata*, *Grammatophora oceanica*, *Pinnu-*

laria peregrina, *P. lyra*, *P. didyma*, *Rhaphoneis Rhombus*, *Tessella catena*, *Spongiolites caput-serpentis*, and a few calcareous Polythalamia. The most interesting form is what appears to be a new species of Dicladia, a genus which has heretofore only been seen in the fossil state. A figure of the species found at New Haven is given in fig. 29.

V. *Recent Infusoria in Mud from Charleston Harbor, S. C.*—A portion of the mud taken from the logs of a wharf in Charleston, S. C. was given to me for examination by Mr. Tuomey. It proved to be quite rich in siliceous infusoria, and also contained a large number of recent calcareous Polythalamia. The following is a list of the contents, as far as I have been able to identify them—viz. *Actinocyclus senarius*, *A. bisenarius*, *Biddulphia pulchella*, *Coscinodiscus excentricus*, *C. patina*, *C. lineatus*, *Dictyocha fibula* α *et* β, *Eupodiscus Germanicus*, *E. Rogersii*, *Fragillaria* ——*?* *Navicula Baltica*, *N. Sigma*, *Pinnularia didyma*, *Rhaphoneis Amphiceros? R. Rhombus*, *Stauroptera aspera*, *Triceratium favus* in very large and beautiful specimens, *Triceratium Reticulum*, *Zygoceros Rhombus*, *Zygoceros Emersonii*, B., *Lithasteriscus tuberculosus*, *Spongiolites acicularis*, *S. cenocephala*, spines of an Echinoderm (Scutella?) and numerous minute but perfect rhombohedral crystals, probably of calc spar.

VI. *Fossil Infusoria in Guano.*—Believing that guano would be likely to contain siliceous infusoria which had been swallowed by sea fowl, and which would not be acted upon in the alimentary canal, I was led to submit to microscopic examination a portion of South American guano, which was furnished to me by Dr. Torrey as an unadulterated specimen. By first removing the soluble and volatile portions, and then diffusing the residue in Canada balsam, I readily found well characterized specimens of Coscinodiscus, Actinocyclus, and other marine infusoria. The species appear to be such as are now living in the waters of the Atlantic, but it is possible that novel and interesting forms may be yet detected, and perhaps some information may by this means be derived as to the relative age of the different deposits.*

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* Since the above observations were made by me, I have received a letter from Robert Harrison, Esq. of Hull, England, dated Nov. 3d, 1844, from which it appears that he also has sought for and found infusoria in guano. He remarks: "I have also found some interesting infusorial forms in the guano of Ichaboe; if you have not seen them, you will be pleased with them."

VII. *Fossil Infusoria of Nova Scotia.*—Specimens of fossil fluviatile infusoria have been sent to me for examination from two localities in Nova Scotia. The first was sent by J. W. Dawson, Esq. from Earlton, Colchester County, Nova Scotia; and the second was received from Owen Mason, Esq. of Providence, R. I., but the precise locality in Nova Scotia from which the latter was obtained, was not mentioned. Both these specimens present all the characters of the purely siliceous infusorial deposits so common in our peat bogs. They are both very white, light, and free from sand. The species most abundant in the specimen from Earlton, are *Pinnularia viridis*, *Cocconema cymbiforme*, *Gomphonema acuminatum*, *Eunotia Monodon*, *E. Pentodon*, *E. serra*, *Gallionella distans*, *Himantidium arcus*, *Surirella splendida*, *Stauroneis Baileyi*, *Spongiolites lacustris*, *S. erinaceus*, &c.

In the specimen sent by Mr. Mason, the chief forms noticed by me were the following: *Pinnularia viridis*, *P. inæqualis*, *Cocconema cymbiforme*, *Gallionella distans* very abundant, *Himantidium arcus*, *Tabellaria trinodis*, *Eunotia Monodon*, *E. Diodon*, *Synedra valens*, &c. No Spongiolites were seen. This specimen is remarkably pure, and free from any mixture of sand or organic coloring matters.

VIII. *Fossil Infusoria with the Bones of the Mastodon.*—I have been furnished by Mr. Connors with specimens of the marl and clay in which was imbedded the admirably preserved head of the *Mastodon giganteus*, discovered in 1843, in Scotchtown, Orange County, New York. The clay and marl were collected at the time the bones were exhumed, and I was assured by Mr. Connors that the marl of which he gave me specimens was a portion collected by himself, of that in which the bones were *imbedded.* This marl is of a light ash-gray color, and contains numerous well preserved fresh-water shells of recent species, among which were several common species of Planorbis, Cyclas, and Lymnæa, some of which still retained their epidermis.

In order to ascertain if this marl contained any siliceous infusoria, I treated it with diluted hydrochloric acid to dissolve out all calcareous matter, and to concentrate in a small mass such insoluble bodies as might be present. The insoluble portion thus obtained was then washed, diffused on glass in Canada balsam, and examined by the microscope. Among the bodies detected,

were *Pinnularia inæqualis*, *Cocconema cymbiforme*, *Gallionella distans*, *Himantidium Arcus*, *Stauroneis Baileyi*, *Surirella splendida*, *Spongiolites lacustris*, *Closterium crenulatum! stellate hairs of Platanus? pollen of Pine*, and *seed-vessels of Nitella* or *Chara*.

If, as I have no reason to doubt, the marl examined was really that in which the bones were imbedded, these results are interesting as they prove, 1st. That siliceous infusoria identical with those now living were cotemporaneous with the mastodon. 2d. That not only siliceous but *membranaceous* infusoria, hairs of plants, &c. may be preserved for ages in calcareous marls, where they may be detected after the calcareous matter is dissolved by acids.

In connection with this I may state, that this same method of observation was applied by me two years ago to specimens of calcareous marls from New Hampshire, sent by Prof. Hubbard, and marls from New York, sent by Prof. James Hall, and that I detected in them not only siliceous infusoria, but a number of well preserved membranaceous coverings of animalcules, such as various species of Closterium, Euastrum, &c. I believe that the occurrence of these in a fossil state has not previously been noticed.

IX. *Fossil Polythalamia of the United States.*—I take this opportunity to tender my thanks to numerous persons who have kindly sent me specimens of various secondary and tertiary marls; and although I have myself, from the want of time and *books*, shrunk from the task of determining and describing the numerous species of American fossil Polythalamia which I have thus been enabled to prove to exist at so many localities; yet no one can regret this, as I have been fortunate enough to induce Ehrenberg to undertake this labor. I have lately had the pleasure of learning from him that he has received all the specimens which I have forwarded to him, and that he is actively engaged in studying them. While we wait therefore for the results of Ehrenberg's examination, it may still be of some interest to present a list of all the North American localities at which I have proved Polythalamia to exist. They are enumerated in the following table.

Nature of Specimen.	*Locality.*	*From whom received.*
1. Carboniferous limestone,	——, Illinois,	D. D. Owen.
2. Yellowish gray calcareous sandstone = 3d formation of upper secondary of Prof. Rogers's Report on New Jersey,	Mullica Hill, New Jersey, Timber Creek, " Near Mt. Holly, "	Lt. French, U. S. A. Mrs. Allen, Gardiner, Me. J. W. Bailey.
3. Green Sand in a Belemnite,	New Jersey,	J. W. Bailey.
4. Nummulite limestone and other specimens,	Claiborne Bluff, Alabama,	Dr. John Torrey.
5. "Rotten limestone,"	Prairie Bluff, "	Lt. G. W. Rains, U. S. A.
6. Marl and limestone,	Selma, "	" " " "
7. Yellow and gray calcareous marl,	Cretaceous formations on Missouri River,	J. N. Nicollet.
8. Gray calcareous marl,	Mission station, northern part of the State of Mississippi,	B. Silliman, Jr.
9. Marl, with *Exogyra costata*,	Cretaceous formation, S. C.	M. Tuomey, Esq.
10. Borings of Artesian well,	Columbus, Mississippi,	B. Silliman, Jr.
11. Cretaceous marl,	Mc Naer's County, Tenn.	D. D. Owen.
" "	White Cliffs, Arkansas.	
12. Borings of Artesian well,	Charleston, South Carolina,	Dr. J. Lawrence Smith.
13. Tertiary marl,	Oregon Territory,	J. D. Dana, Esq.
14. Eocene marl,	Pamunkey River, Virginia,	Mr. Tuomey.
" "	Fort Washington, "	Prof. W. B. Rogers.
15. Matrix of bones of Zygodon,	——, Alabama,	Mr. Buckley.
16. Meiocene marl,	Petersburg, Virginia,	Mr. Tuomey.
17. " "	Pamunkey River, "	" "
18. " "	Wilmington, North Carolina,	J. D. Hodge.
19. " "	North Carolina,	Mr. Tuomey.
20. Post pleiocene,	South Carolina,	" "

Without anticipating the results of Ehrenberg's examination of the above materials, I may be allowed to state, as the result of my own observations,

1st. That all these specimens abound in Polythalamia, and that they are remarkably abundant and beautifully preserved in the specimens from Charleston, S. C., Petersburg, Va., Pamunkey River, Va., and in Mr. Nicollet's specimens from the Missouri River.

2d. The specimens from Fort Washington presented me with what I believe have never before been noticed, viz. distinct *casts* of Polythalamia. That these minute and perishable shells should, when destroyed by chemical changes, ever leave behind them indestructible memorials of their existence, was scarcely to be expected, yet these casts of Polythalamia are abundant and easily to be recognized in some of the eocene marls from Fort Washington. A figure of one of these casts is given in fig. 30.

3d. The *groups* of Polythalamian forms in the different geological formations of North America are remarkably distinct, and when they have been properly studied and the *characteristic*

forms of each determined, it will be easy to ascertain the true position of any secondary or tertiary deposit from the examination of geological specimens not larger than mustard seed, and which to the naked eye would offer no trace of organic remains.

4th. Microscopic bivalve crustaceans, resembling Cypris in form but of marine origin, are very abundant in many of our tertiary deposits.

EXPLANATION OF THE FIGURES IN THE PLATE.

All the sketches which accompany this paper, except A, B, C, and D, were drawn from nature by myself, by means of the camera lucida eye-piece attached to Chevalier's microscope. Most of them are mere outlines; but it is believed they will assist a student of this difficult subject. They are all drawn to the scale shown in fig. 32. Figs. A, B, C, and D, are copied from a plate of Ehrenberg's in the Report of the Berlin Academy for June, 1844.

Fig. A. Heliopelta Leeuwenhoekii, Ehr. Fossil at Bermuda.

Fig. B. Asterolampra Marylandica, Ehr. Fossil at Piscataway, Md.

Fig. C. Symbolophora Trinitatis, Ehr. Fossil at Piscataway, Md.

Fig. D. Craspedodiscus elegans, Ehr. Fossil at Bermuda.

Figs. 1, 2, 3, 4. End views of fossil infusoria allied to Terpsinoe? Oregon.

Fig. 5. Side view of the same. Oregon.

Fig. 6. New species of Surirella. Fossil at Oregon.

Fig. 7. New species, α of Gallionella. Fossil at Oregon.

Fig. 8. New species, β of Gallionella. Fossil at Oregon.

Fig. 9. New species, γ of Gallionella. Fossil at Oregon.

Fig. 10. Small fossil Navicula? Fossil at Oregon.

Fig. 11. Sceptroneis Caduceus, Ehr. Fossil at Bermuda.

Fig. 12. Mastogonia heptagonæ? Ehr. Fossil at Bermuda.

Fig. 13. Stephanogonia polygona, Ehr. Fossil at Bermuda.

Fig. 14. Xanthiopyxis oblonga, Ehr. Fossil at Bermuda.

Figs. 15, 16, 17. Peripteræ? Fossil at Bermuda.

Fig. 18. Chætoceros Bacillaria, Ehr. Fossil at Bermuda.

Fig. 19. Chætoceros Diploneis, Ehr., with the spines partly broken off. Fossil at Bermuda.

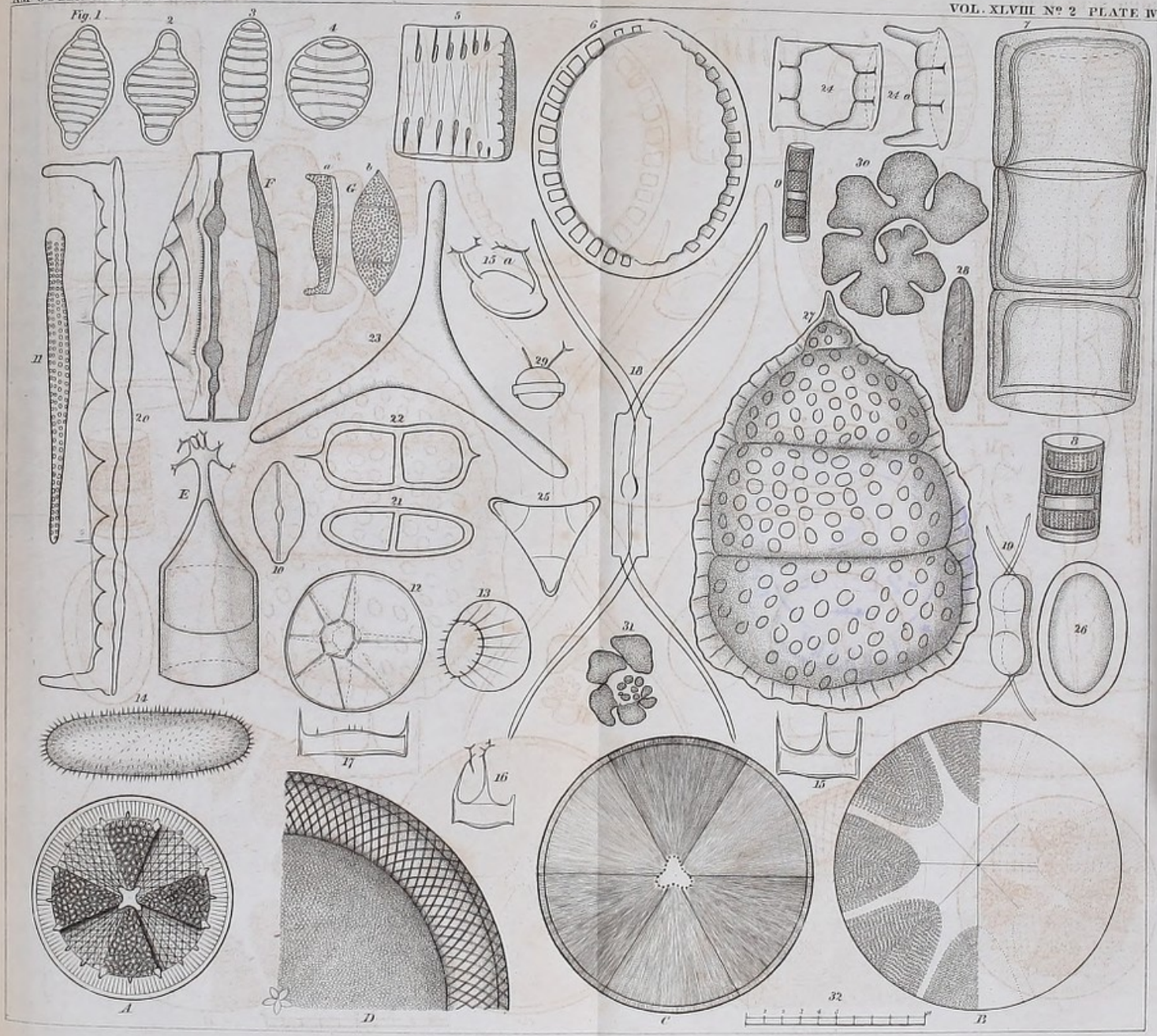
These figures, 18 and 19, I believe are only different *positions* of the *same* species, for which I would retain the name *C. Diploneis*, Ehr.

Fig. 20. Denticella polymera, Ehr. Fossil at Bermuda.

Fig. 21. Dictyocha Ponticulus, Ehr. Fossil at Bermuda.

Fig. 22. Dictyocha Quadratum, Ehr. Fossil at Bermuda.

Fig. 23. Triceratium Solenoceros, Ehr. Fossil at Bermuda.



Fossil and Recent Infusoria.

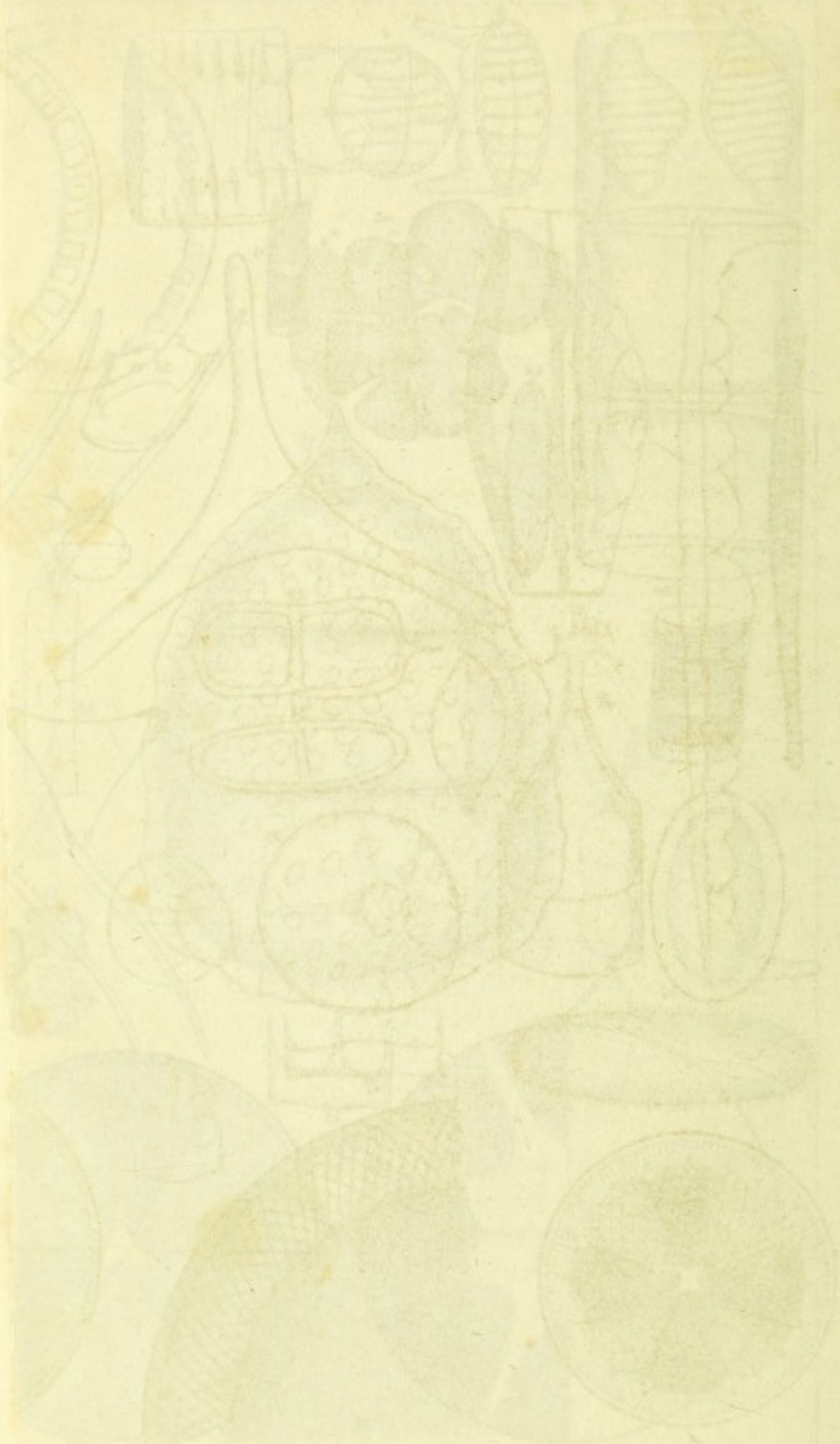


Fig. E. Rhizosolenia ! ——— ? Fossil at Bermuda.

Fig. F. Goniothecium Odontella, Ehr. Fossil at Bermuda and Virginia.

Fig. G. Zygoceros ? Bipons, Ehr. Fossil at Bermuda.

Figs. 24 and 24*a*. Biddulphia or Denticella, new species. Fossil at Brown's Mills, near Westmoreland Court House, Va.

Fig. 25. Triceratium ———, new species ? Fossil at Meherrin River, recent in Charleston harbor.

Fig. 26. Goniothecium ? ———, new genus ? Fossil at Bermuda, Rappahannock Cliffs, Brown's Mills, &c.

Fig. 27. Lithocampe ———, new species ? Fossil at Piscataway, Md.

Fig. 28. Stauroptera ———, new species ? Fossil at Meherrin River, Va.

Fig. 29. Dicladia ———, new species ? Recent in New Haven harbor, Conn.

Fig. 30. Cast of a fossil Polythalamian shell. Petersburg, Va.

Fig. 31. Cast of a fossil Polythalamian shell. Fort Washington, Va.

Fig. 32. Scale showing $\frac{10}{100}$ths of a millimetre, magnified equally with the drawings.