

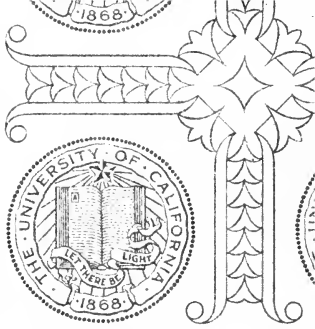


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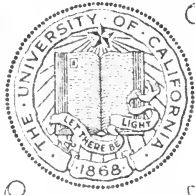
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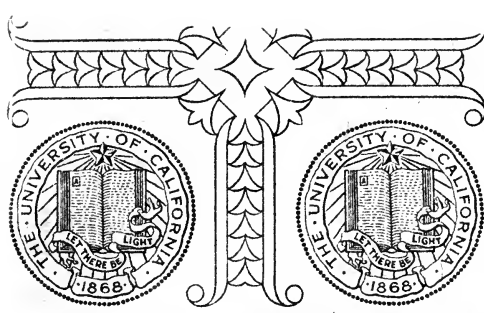
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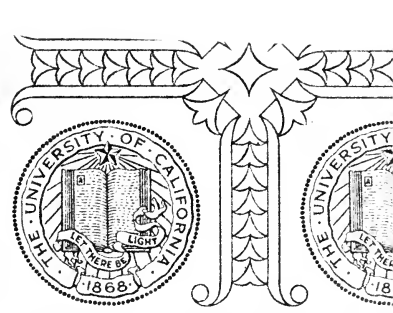
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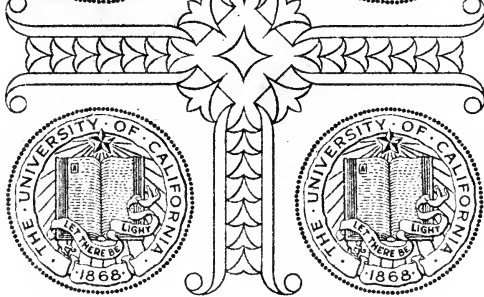


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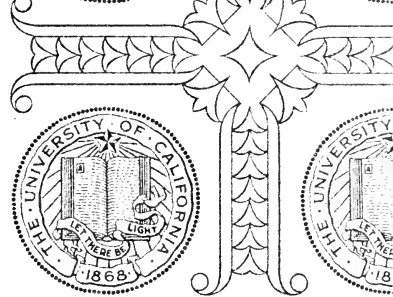
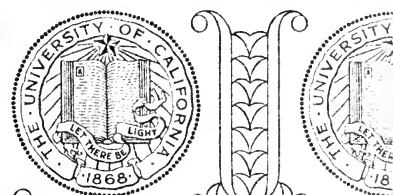


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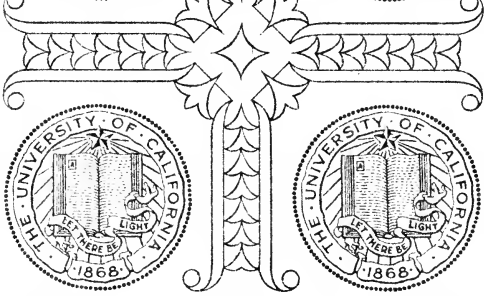
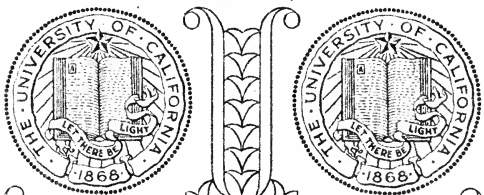


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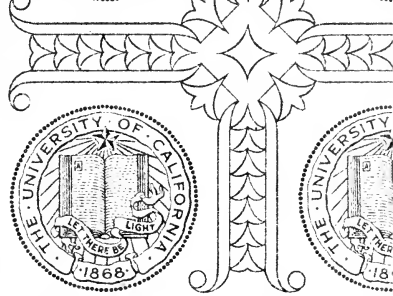
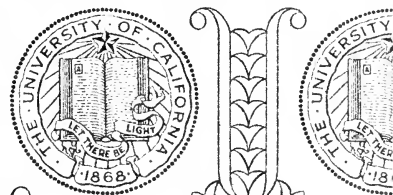


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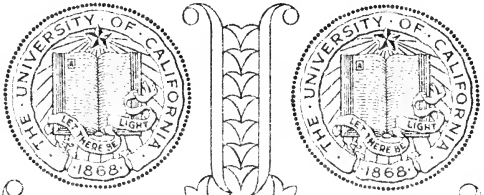


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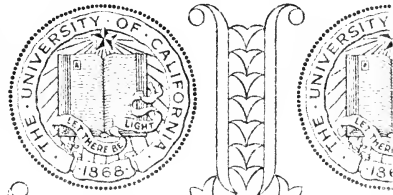
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CONTRIBUTIONS

TO

GEOLOGY.

BY

ISAAC LEA,

MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY ;
OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA ;
OF THE LYCEUM OF NATURAL HISTORY OF NEW YORK ;
HONORARY MEMBER OF THE MEDICAL SOCIETY OF ORANGE COUNTY,
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MEMBER OF THE ROYAL PHYSICAL SOCIETY OF EDINBURGH ;
OF THE BRITISH ASSOCIATION OF SCIENCE ;
OF THE NATURAL HISTORICAL SOCIETY OF MONTREAL ;
CORRESPONDING MEMBER OF THE LINNÆAN SOCIETY OF BOURDEAUX,
ETC. ETC.

PHILADELPHIA :

CAREY, LEA AND BLANCHARD.

1833.

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TO VISIT
AIRBORNE

Philadelphia:
Printed by James Kay, Jun. & Co.,
Race above 4th Street.

TO

CHARLES TAIT, ESQ.

OF CLAIBORNE, ALABAMA.

My dear sir,

Your having first called my attention to the Tertiary Formation of Alabama, and owing to your kindness, as I do, all the species described in this volume, from the deposit at Claiborne, gives you a strong claim upon me, which is only equalled by the pleasure I have in offering to you the dedication of this volume.

I am, my dear sir,

Very sincerely, and very truly yours,

ISAAC LEA.

Philadelphia, November 1, 1833.

ERRATA.

- Page 39, line 12 from the top, for *Solecurtis* read *Solecurtus*.
Page 42, line 12 from the top, for *anguar* read *angular*.
Page 68, line 16 from the top, for *Miscene* read *Miocene*.
Page 85, line the last, for *supercretacious* read *supercretaceous*.
Page 89, line 15 from the top, for *Mantilli* read *Mantelli*.
Page 107, line 18 from the top, for *callous* read *callus*.
Page 111, line 19 from the top, for *out* read *outer*.
Page 153, line 4 from the top, for *Monoceres* read *Monoceros*.
Page 176, line the last, for *Lamberti* read *Lambertii*.
Page 195, line 17 from the top, for *granulation* read *granulations*

PREFACE.

IN publishing the present work, I hope to add some new facts, contributing to the development of the geology of our country. Little, comparatively, has yet been accomplished in defining with perfect accuracy, most of the beds of the great geological masses of our extended formations; and these contributions are presented with a view to assist, though in a small degree, in the accomplishment of an object desirable to every American geologist, a perfect and thorough knowledge of American geology.

Presuming the species to be new, I have endeavoured to make minute descriptions, accompanied by faithful figures of each, with the hope of determining their characters permanently.

The small contributions at the end of this volume are added, in the hope of their proving to be of some interest, the specimens having been for some years in my possession, without a favourable opportunity before presenting itself for their publication.

Having last spring, after my return from Europe, finish-

ed a supplement to my fourth memoir, as well as some observations on Lamarck's species of the *Naiades*, (to be published in the Transactions of the American Philosophical Society) I found myself sufficiently at leisure to take up the fossils from Claiborne, Alabama, which had been so long in my possession, and which had not before been described. The want of time alone had prevented an earlier attention to them.

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TERTIARY FORMATION

OF

ALABAMA.

INTRODUCTION.

THE rapid development of the science of Geology has in Europe, within the last few years, called to its aid the attention and exercise of the highest talent. In this country, we have been making a regular, though not so rapid a progress, in the knowledge of our widely extended and interesting deposits; and it is to be regretted, that our investigations have not yet been sufficiently extended to enable us to institute, in all the strata, such comparisons as would allow us to decide, with precision, as to their equivalents in Europe. This can only be done with success, after the fossil conchologist shall have developed a large portion of the genera and species of our different masses.

Until recently, it was considered, that a single cataclysm had left behind its desolating sweep, all the organic remains inhumed within the bowels of the earth. The observations of recent philosophers, more exact, prove to us, beyond contradiction, “that the earth’s surface has been, and still is, subject to incessant fluctuation and movements.”*

If we turn our attention to the examination of the earliest period where organized matter has been discovered (in the lowest Fossiliferous group of De la Beche), we find the indications of animal life extremely rare, and we may conclude that the change from the crystalline rocks† to that

* Geology of the South of England, by G. Mantell, p. xiv. of Introduction.

† This class of rocks so well known under the name of Primitive rocks,

of this formation, was co-existent with their primeval existence. This author very justly observes, that "whatever the kind of animal may have been which first appeared on the surface of our planet, we may be certain that it was consistent with the wisdom and design which have always prevailed throughout nature, and that each creature was peculiarly adapted to that situation destined to be occupied by it."

The *Grauwacke* group,* which lies above the last mentioned formation, contains many genera of shells and other organic remains. Some of these genera, which consisted of innumerable species, are, in the superior deposits, totally wanting, being entirely extinct, to the best of our knowledge; while other genera, unknown in the vast deposits of the inferior formations, are here found in great abundance and in numerous species.

In the strata superior to this, the Carboniferous group, we find, for the first time, a deposit of fresh water formation, and the fossil remains of the group are increased by the addition of plants and fishes.

Superior to this again we find the *New Red Sandstone* group, and in it some of the reptilia, the great Saurian animals.

Higher up, the Oolitic group presents us with a much greater variety of reptilia, and for the first time we have the indication of Mammalia in the *Didelphis Bucklandi*. Plants, zoophytes, shells, crustacea, &c. are numerous, and insects have also been observed in it.†

(Agalysian rocks of Brogniart) presenting nearly the same character in all parts of the world, seem, by their attrition, to have formed, in subsequent deposits, the whole mass of superincumbent rocks, except those of volcanic origin.

* Hemilysiens of Brogniart includes this and the subsequent group.

† In the U. States, no indication of the Oolitic group has been observed. In England it is a very important formation, consisting of numerous sub-formations, of which the Lias is the lowest.

In the Wealden formation, overlying the last, and belonging to the Cretaceous group* of De la Beche, we find such organic remains as prove it to be of fluviatile origin. The shells found, are those which are known to exist only in rivers, (*Uniones*, &c.) and those genera which are considered as estuary shells. In it the reptilia are numerous. Superior to this formation, we find in the same group, the Lower green sand, the Gault, Upper green sand, and the Chalk, which to the geologist of this country are of great interest, as we find in these deposits generally known as "marl of New-Jersey and Delaware," a part of their equivalents.†

The Supercretaceous group,‡ which is next in superposition, contains organic remains of the highest interest. Consisting of various deposits, and many localities in Europe, as it does in this country, much attention has been given to it there, and more recently, it has attracted the notice of our geologists.

The observation of Mr Lyell, that the Tertiary groups of Europe have detached and isolated positions, while the Secondary period extends over great areas, applies equally to our country. In these groups we, for the first time, find those species of shells which we are able to identify with living species, while those genera which existed in such abundance in the inferior formations, have here nearly disappeared. Of the genus *Ammonites*, *two only* of the one hundred and eighty-three described in Great Britain

* Pelagiques of Al. Brogniart includes this and the Oolitic group.

† It is to Prof. Vanuxem (Jour. of the Acad. of Nat. Sci. of Phil., vol. 6, p. 59) we are indebted for the identification of this formation with the Cretaceous group of Europe. This geologist having collected littoral shells from the Burr-stone of Georgia, brought to this city during our late war, when the foreign importation ceased, and having collected the pelagian remains of New Jersey, was led to conclude, while in France, in 1818, examining the Paris basin, that the alluvial of M'Clure consisted of Secondary, Tertiary and Alluvial masses.

‡ Thalassiques of Al. Brogniart.

are found so high up as the London Clay; and to the deposits superior to this, the genus is entirely wanting. Nearly the same observations extend to the genera *Orthocera*, *Belemnites* and *Hamites*. We look to the Tertiary Formation with peculiar interest, as its lower deposit or period contains the incipient state, or as Mr Lyell says, “the dawn of the existing state of the animate creation.”

The division of the Tertiary Formation into three epochs, has been admitted by most modern geologists. For these, Mr Lyell* proposes, in the descending order, the names of Pliocene period, Miocene period, and Eocene period. The first is derived from the Greek words *πλασιων* major, and *καινος* recens, as most of them are recent species, and of course, of later deposit. This he subdivides into the Newer and Older Pliocene, in which division M. Deshayes does not agree with him. The second, Miocene, is from *μειων* minor, and *καινος* recens, there being here a minority of recent species. The third, the Eocene, is derived from *ηως* aurora, and *καινος* recens, this being “the dawn of the existing state of the animate creation.”

In the lowest of these, the Eocene period,† there have been observed in Europe one thousand two hundred and thirty-eight species, of which the very small number of forty-two have been identified with recent species. “Of fossil species, not known as recent, forty-two are common to the Eocene and Miocene epochs.”‡ It is remarkable, too, that the living species are rarely inhabitants of the shores of those countries in which they are found in a fossil state, inhabiting now more southern climates.

The next period of deposit, that of the Miocene, is a for-

* Principles of Geology, vol. 3, p. 53.

† Mr. Lyell, with great propriety, includes in this period the Plastic Clay with the London Clay; the line of separation of which, he says, “is quite arbitrary.” Principles of Geology, vol. 3, p. 278.

‡ Principles of Geology, vol. 3, p. 55.

mation distinct in its characters from the London Clay below, and the English Crag above it. In it, M. Deshayes has observed one thousand and twenty-one species, one hundred and seventy-six of which, only, are found in a recent state.

Superior again to this, in the Pliocene period, we find the recent species comparatively abundant. Mr Lyell in dividing this into the Older and Newer Pliocene, observes, that "the plurality of living species is so very decided." The former includes the Subappennine hills, and the English Crag; the latter, the Sicilian beds.

It has been stated that forty-five hundredths of the species found in the English Crag exist in a recent state;* while in the Sicilian beds, according to Mr Lyell, ten only out of two hundred and twenty-six are extinct or unknown, nearly the whole of them existing at the present time in the neighbouring seas.

In addition to the marine reliquiæ, the remains of terrestrial mammiferous animals afford us, in the Tertiary Formation, a striking proof of the extraordinary change which has taken place. Of the numerous species the remains of which are there found, none now exist. "More than forty of these Eocene mammifers, are referable to a division of the order Pachydermata, which has now only four living representatives on the globe; of these, not only the species, but the genera, are distinct from any of those which have been established for the classification of living animals."†

The Mammalia of the Miocene agree in some of the genera with recent animals, and those of the Pliocene are "an intermixture of extinct and recent species of quadrupeds."‡

Superior, and next to the Tertiary, is De la Beche's Erratic Block Group, and above it, his Modern Group.

* Address of the Pres. of the Geo. Soc. 1833.

† Principles of Geology, vol. 3, p. 59.

‡ Principles of Geology, vol. 3, p. 60.

These two are embraced in Mr Lyell's Recent Period, and here are found to exist the remains of those large animals, the *Mastodon*, *Hippopotamus*, *Megatherium*, *Rhinoceros*, &c. &c. To this Recent Period, belong the causes which are now so evidently in action, and with which we are familiar, such as the formation of coral reefs and islands, deltas, travertins, active volcanoes, &c.

Viewing these changes, the facts of which have been established by the united exertions of geologists, within a comparatively short period, we reflect with intense interest on the disappearance from our planet of an immense number of species, numerous genera, and even some families !

The causes of the vast changes which it is evident to our senses, have taken place, are among the most interesting which have engaged the attention of mankind. Theories of all kinds have been promulgated, and little good has arisen from them, except that of the gradual development of facts, the accumulation of which has added to our stock of knowledge. It is said to be Fuchsel (a German geologist) who first asserted that the causes now in operation were sufficient to produce the changes observed in our strata. "Similar changes may now take place ; *for the earth has always presented phenomena similar to those of the present day.*"* Such is the remarkable language of the author, published about seventy years since. Very recently, the theory of actual causes has been considered in England, by some of her ablest geologists, as sufficient to satisfy the attentive observer. Mr Lyell may now be considered as the leader of this theory, and the mass of facts brought together in his admirable work, would seem to be enough to satisfy the most sceptical.

The rapid change which is now going on in the

* De la Beche's Geol. Man., p. 182, first English edition.

greatest altitudes of Switzerland, points out to us the mode in which nature is operating by decomposition, and the attraction of gravitation. When standing on the borders of the Mer de Glace, and while crossing its frozen bosom, this operation was brought most forcibly to my mind. Every moment my ears were saluted with the sound, more or less distant, of rocks precipitated from some height into the abysses below, and which reverberated over this frozen sea. The time may come, when the pinnacles of Mont Blanc and other mountains, which surround the beautiful valley of Chaumonie, will have been precipitated to their bases, and the débris be so completely carried off as to leave, perhaps, that beautiful and fertile spot itself, the highest pinnacle of the country, a naked rock, to be gazed at from a distance.*

Perhaps the most difficult point to solve, is that which presents itself in the fact, that deposits in high latitudes contain animal and vegetable remains, presumed by analogy to be unable to exist in their temperature at the present period. A change in the earth's axis would, of course, affect the temperature of its surface, but whether that can take place under any known law, in a sufficient degree to effect such a change, has certainly not been established. Sir John Herschel has supposed that a change of temperature might take place in the change of the elliptical orbit of the earth, which becomes gradually more circular.†

* Since writing the above, I have observed the following passage in Lyell's *Principles of Geology*, vol. 3. "Those naturalists who have seen the glaciers of Savoy, and who have beheld the prodigious magnitude of some fragments conveyed by them from the higher regions of Mont Blanc, to the valleys below, to a distance of many leagues, will be prepared to appreciate the effects which a series of earthquakes might produce in this region, if the peaks or 'needles,' as they are called, of Mont Blanc, were shaken as rudely as many parts of the Andes have been in our times."

† *Geol. Manual*, p. 6.

The greatly extended Tertiary deposits on the Atlantic coast of our country, present one of the most interesting of the geological phenomena known in it. To ascertain the relative age of the deposits of the same formation in Europe, has engaged the attention of the fossil conchologist there for many years. With us, partial examinations of the fossils of the different beds, have already been made by several of our geologists. In the course of my investigations, I have satisfied myself of the identity of our Tertiary Formation with that of Europe.

After a careful examination of a great number of genera and species, from the Tertiary of Claiborne, Alabama, I had no hesitation in referring them to the same period as the London Clay of England and the Calcaire Grossier of Paris; although this deposit is composed of silicious sand, while that of the London Clay is argillaceous, and the Calcaire Grossier is calcareous. This part of the Tertiary Formation, as before stated, is called by Mr Lyell, the Eocene Period. It abounds in the greatest variety of fossils; one thousand two hundred and thirty-eight species of shells having in Europe, as before mentioned, been noticed in it. I have already observed nearly two hundred and fifty species from Claiborne, descriptions of two hundred and nineteen of which being supposed to be new, will be found in their proper order, in this memoir and its supplement.* It is an extraordinary fact, that among the whole of these, there cannot be, with absolute certainty, a single species found to have its analogue in a living species. Some

* Mr Conrad has described twenty-five species. See Fossil Conchology, Nos. 1 and 2, and the American Journal of Science and Arts, vol. 23, p. 339.

of the genera are unknown on our coast ; some are found only in a fossil state in Europe, and others are entirely new. I am not perfectly satisfied that a single species is strictly analogous to those from the Eocene Period of Europe, but the number of turritid shells and similar genera prove it to be of the same epoch. The *Venericardia planicosta* (as *Cardita planicosta*) has been noticed by Mr Conrad as being of this locality. This is at least a variety, for it differs from those of the Eocene of the Paris basin in the number of its ribs, if not in some other characters. Three specimens from this formation, in my cabinet, contain individually thirty-one, thirty-four and thirty-six ribs, while of the first fourteen counted from Claiborne, three gave twenty-seven, four gave twenty-eight, two gave twenty-nine, and five gave thirty ribs. Mr Conrad describes his specimen (from Maryland) as having about twenty-two ribs. There are two other species from Claiborne, which resemble those of the Eocene of the Paris basin. One is a *Fusus*, very similar to the *F. longævus* of Lamarck, but the specimen being imperfect, I cannot decide upon it with precision ;* the other is *Acteon*† *lineatus*, (see description) which very closely resembles the *Tornatella inflata* (Ferussac).‡

The formation near Fort Washington, on the Potomac, below the city of Washington, may, I think, be referred to the same period as that at Claiborne. I owe to the kindness of Professor Vanuxem, specimens obtained there, many years since. Some of these shells have been since described by Mr Conrad, *Cucullæa*§ *gigantea*, *Turritella Mortoni*, &c. Future investigations may produce such results as will enable us to trace, with more exact-

* I propose for it the provisional name of *Claibornensis*.

† *Tornatella* (Lamarck).

‡ Description des Coquilles Fossiles des Environs de Paris, t. 2, pl. 24, figs. 4 and 5.

§ Two species only of this genus have been observed in the Tertiary of Europe. Both are in the Eocene of Paris.

ness than we can at present, the parallel of these deposits, and men of science being now engaged in Maryland, by order of the legislature, to make geological researches, we may hope, ere long, to have this, with other deposits of the state, better known than they are at present. The deposit at Vance's Ferry, South Carolina, has been observed by Dr Blanding to contain one of the characteristic fossils of the Eocene Period, the *Venericardia planicosta*, and in the cabinet of that naturalist I have observed several other genera, which distinctly identify it with that epoch.

It is a matter of considerable doubt, if any Tertiary deposit, contemporaneous with the Miocene Period of Mr Lyell, has yet been observed in our Formations. The deposits of Bourdeaux, Dax, Turin, Ronca, Vienna, and some other places on the Continent, are of this period, but it is not, I believe, known to exist in England. Future investigations may, in the vast extent of our southern deposits, discover its existence.

The Older Pliocene Period of Mr Lyell, finds its equivalent, I think, in the well known deposit of St Mary's, Maryland. Mr Conrad, who has carefully examined the deposit at this place, has given us a catalogue of fifty-six species observed there by himself. Of these, about one third are known to exist on our coast; but some of them in more southern latitudes. The deposits of York Town, Smithfield, and Suffolk in Virginia, and those of Easton and St Mary's in Maryland, as well as that of Cumberland county, in New Jersey, are referred by that geologist to the Upper Tertiary, and, without doubt, belong to the Older Pliocene Period of the Tertiary.

Of the Newer Pliocene Period we have an equivalent in the deposit at the mouth of the Potomac; the distance of which, in a direct line, is about forty-five miles from the ocean, the intervening country being low and

level. Mr Conrad has examined this deposit, and says, "not only are the fossils of this locality the same as existing species, but, in some instances, they retain their colour."* Of those in his table, consisting of twenty-nine species found there, he has been able to recognise all but seven as existing in a recent state, and the most of these will, I have no doubt, be hereafter found on our coasts. One of them, the *Cytherea convexa*, may already be removed from the exceptions. I owe to the kindness of Colonel Totten, of the engineer corps, specimens of this species, from the coast near Newport, Rhode Island. A deposit of this epoch is also found beneath the surface at Charleston, S. C. Professor Vanuxem gave me specimens taken from a well of that city, some of which are so fresh as still to exhibit the original colours. They consist of the genera *Arca*, *Amphidesma*, *Clathradon*, *Mactra*, *Tellina*, *Marginitella*, *Fusus*, *Oliva*, &c.

The rich and highly interesting Formation at Claiborne, Alabama, was called to my attention by my friend, Judge Tait, a citizen of that place, in January 1829. The beautiful specimens he sent me at the close of the year, induced me to obtain from him further shipments of the fossils from the same stratum, and specimens from the inferior and superior strata, as well as some account of the geographical position of the place.

In his letter of July 20, 1831, he says, "the town of Claiborne is built on a bluff, on the east, or south side of the Alabama river. In a direct line, it is about ninety miles from the gulf of Mexico. The bluff is estimated to be two hundred feet high. It is at least that. That Forma-

* Journal of the Academy of Natural Science of Philad., vol. 6, p. 207.

tion which is so remarkable, and passes through the whole extent of South Alabama, called the Shell Limestone Country, embraces this bluff. The southern edge of this Formation commences about ten miles south of this place. It is, no doubt, about one hundred miles wide from south to north, in this part of the state. It is believed that this limestone tract takes its beginning at the gulf, in the neighbourhood of St Mark's and Tallahassee, and extends from that point north west, through the whole of this and the state of Mississippi, and is said to terminate at the Chickasaw Bluffs, in West Tennessee. This Formation is probably of the same nature with that which extends through South Carolina, Georgia and Florida, parallel to the sea coasts, and terminates on the gulf of Mexico, at or about St Mark's. The course of this Atlantic Formation is from the north east to the south west. The country between the Shell Limestone tract in this state, and Mississippi and the gulf, is a barren sand, with the long leaf pine (*Pinus australis*), &c. as its principal forest growth."

With the specimens then sent, was received a short stragraphical account of each which is here inserted.

"No. 1 is a specimen of the stratum, from the water line up about one hundred and twenty feet, extending below the water as far as can be discerned by the eye."

This specimen was nearly six inches square. It is a soft calcareous rock, containing eleven per cent of carbonate of lime,* with occasional specks of mica, and small cells filled with carbon. In breaking it up, to present as much surface as possible, I examined it carefully, to endeavour to identify the fossils contained in it, but these could only be seen in a very imperfect state, and almost universally in fragments. They consisted generally of *Flustra*, *Cardia*, *Corbula*, *Os-*

* To the kindness of Dr J. K. Mitchell I am indebted for the analysis of these specimens.

træ, *Volutæ*, *Naticæ* and *Turritellæ*. The shells were so friable as almost to fall into powder on the touch, and presented no characters whereby to make specific distinctions.

With this slight knowledge of the stratum, it is not without some hesitation that I refer it to the Tertiary Formation. Future investigation may prove it to be of older origin, when its fossils shall be obtained in a more perfect state.

“No. 2 is a specimen of the rock lying on the above stratum, No. 1, and is about the thickness of two feet.”

This specimen, nearly of the size of the last, consists, chiefly, of a single and imperfect valve of a large *Ostrea*. It appears to be a compact calcareous rock, with numerous grains of dark green sand; and besides the *Ostrea* mentioned above, *Flustræ*, and a *Teredo* may be observed in it. On examination, the matrix proved to have nearly thirty-two per cent of carbonate of lime. This bed may be referred to the same Formation with the last.

“No. 3. This is the stratum from which are taken the specimens of organic remains in the box. It is just seventeen feet thick. This specimen* is a fair representation of the whole stratum.”

It is in this stratum that the fossils described in this memoir are found. It is exceedingly rich, and some idea may be formed of the vast number of new species contained in it, when it is recollected that I have received from Judge Tait, at four or five different times, more than two hundred and fifty species. Were I to conclude from the examination of what were received, I would say that this is a very small portion of what will be found in that stratum.

The bed is composed of loose quartzose, brownish sand, the grains of which are small and angular. The most delicate specimens are, therefore, with a little caution,

* A very large *Crassatella*, since described by Mr Conrad as *C. alta*.

removed in a perfect state. In the few boxes which I have received, seven shells are not referable to any known genus, and two hundred and ten species, besides nine species of *Polypti*, are not referable to any known species. These are now first described, and figured. Sharks' teeth of several different forms; part of a claw of a species of *Cancer*; some fragments of a fossil very similar to what Brander figures under the name of *Palatium piscium*, and the tooth, spine and vertebræ of fish were found among the sand. In the further investigation of this stratum, the fossil conchologist has a field rich in its products, and the harvest will amply reward his industry.

"No. 4. This represents a thin stratum lying upon the above, No. 3; it is about eighteen inches in thickness."

This specimen was large, and on breaking it into fragments, casts of several genera were observed. The calcareous matter of the shell presenting nothing more, generally, than a white powder, being completely decomposed, identification of species was impossible. The genera which seem most to prevail, are *Avicula*, *Venus*, *Crepidula* and *Turritella*, and were I to decide on the matter, I should, perhaps, refer them to the same species which exist in the inferior stratum, No. 3. The mass of the rock is friable, easily separating into irregular pieces, and is composed chiefly of light and dark green grains of quartzose sand. These grains do not present angles, but are rounded and smooth, and are cemented by carbonate of lime, the analysis proving the mass to possess about thirty-three per cent. It will scarcely admit of a doubt, that this is of the same epoch as the last described stratum.

"No. 5. A specimen of a stratum, two feet thick, next above No. 4, and lies under a thick stratum of rotten limestone, which reaches near to the top of the bluff."

This is a mass of sand and shells slightly adhering, by an earthy ferruginous matter, which gives a reddish

brown appearance to the whole. The calcareous matter of the shells is so much decomposed as to fall to pieces by the touch. It is, therefore, almost impossible for a perfect specimen to be removed from its matrix. *Avicula*, *Venericardia*, *Nucula*, *Venus*, *Teredo*, and a few other genera, may be observed in the specimen, and the species may be all, so far as made out, referred to those in No. 3, and, of course, the stratum be referred to the same epoch. In it are fine specimens of the *Scutella crustuloides* (Morton), some of which measure three and a half inches in diameter.

“ No. 6, is a specimen of the stratum, forty or forty-five feet thickness, and called here, ‘rotten limestone.’ ”

“ On this layer of No. 6, is a deposit of sand and gravel, mixed with clay, of about twenty feet, through which and above the stratum No. 6, break out the Bluff springs, of which there are many, say six or eight, along the Bluff. In digging wells we find water in about twenty feet, in a stratum of white sand and quartz pebbles of all sizes, from that of a pea to a pigeon’s egg, of different forms, some flat—some round—some elliptical. These pebbles are smooth, as if made so by attrition. All the water from this Bluff, whether from the springs or the wells, is impregnated more or less with carbonate of lime. The wells generally more so than the Bluff springs.”

This specimen was five or six inches square. On fracturing it, obscure casts of *Corbula*, *Nucula*, and some other bivalves could be identified with some which exist in No. 3, and the strata between. The casts of a few spiral univalves were also discernible. A small and very thin *Pecten*, with delicate ribs, seemed to be the only shell which left its trace in a calcareous state. On each side of the fracture a silvery whiteness marks the deposit of this thin and fragile species. The mass of this rock, or as it might with more propriety, perhaps, be called indurated

clay, contains twenty-eight per cent of carbonate of lime. Scattered grains of minute dark green sand may be observed throughout the mass.

This stratum is the last of this interesting Tertiary group, and upon it is found the Diluvium.

Read before the Academy of Natural Sciences
of Philadelphia, 27th August 1833.

IN presenting myself to the Academy this evening, with a paper on a geological subject, my first duty is to make my acknowledgements to the very great kindness of the gentleman who has, during some years of labour, placed in my possession numerous fossils from the vicinity of Claiborne, Alabama, most of which I have discovered to be new species. As early as in January 1829, Judge Tait first called my attention to the existence of the "organic remains that abound in that part of the state," promising me at the same time, to make a collection of them and to forward them to me. This promise he redeemed at the close of the year, by sending me a large quantity of the most interesting Tertiary fossils. Finding in the same box specimens which I suspected to be of secondary origin, I wrote for, and subsequently obtained from my friend, a complete suite of specimens of the various strata at Claiborne, with valuable notes and observations from his pen. These were sent in July 1831. Unwearied in his efforts to place in my possession every thing that could illustrate the deposits of his vicinity, that gentleman subsequently, and at different times, with continued kindness, sent me three or

four boxes of these fossils, one of which, unfortunately, was lost, after its arrival at New York.

I am, therefore, indebted to Judge Tait, for every new species described in this paper, and to him science owes the great obligation of having first brought them to light.

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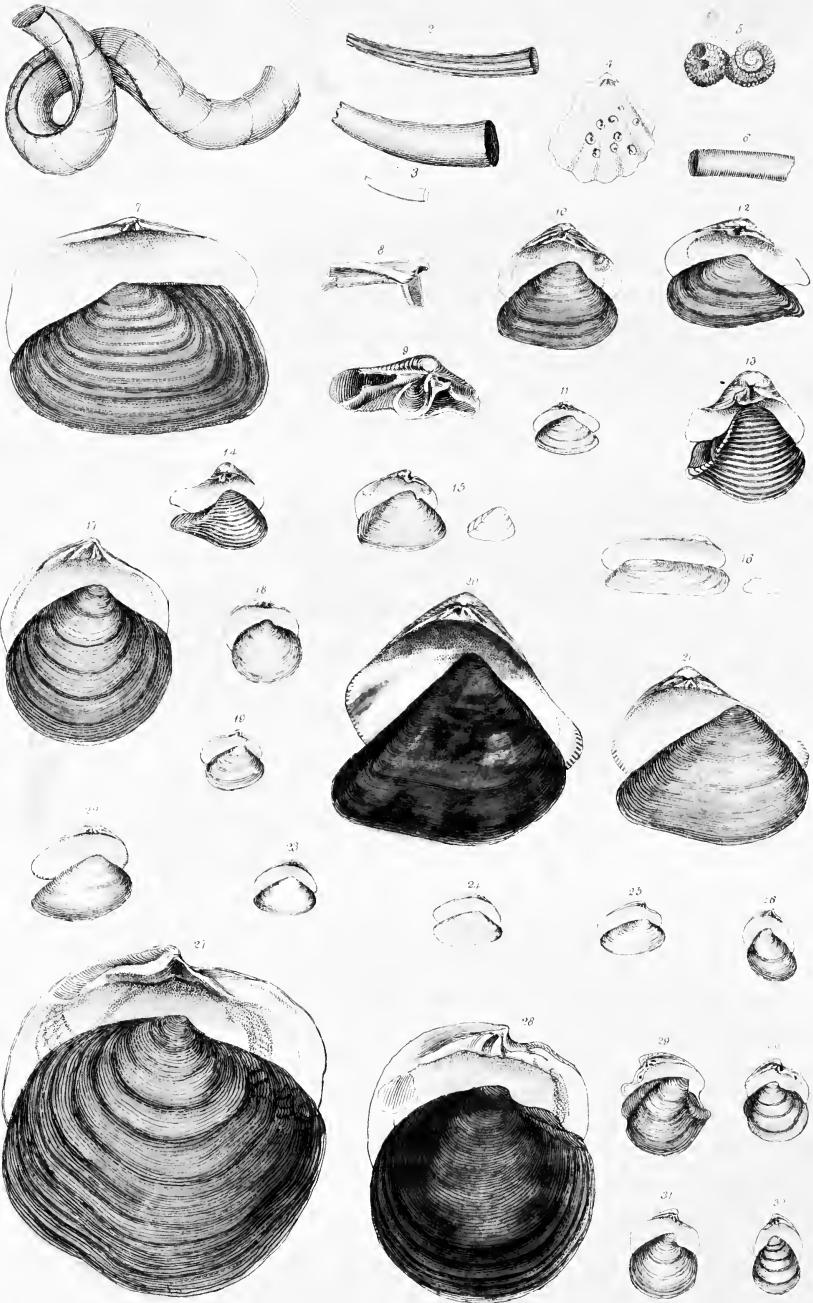
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| 2 DENTALIUM | <i>alternatum</i> | 13 | <i>Murchisoni</i> | 21 | <i>ovale</i> |
| 3 | <i>turicum</i> | 11 | <i>subbosa</i> | 25 | <i>plana</i> |
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| 11 | <i>pygma</i> | 22 | <i>subtrigona</i> | | |

CLASS ANNULATA.

ORDER SEDENTARY ANNULATA.

FAMILY DORSALIA.

GENUS SILIQUARIA. *Lamarck.*

S. Claibornensis. Plate 1. Fig. 1.

Description. Shell round and spirally tapering, longitudinally and indistinctly furrowed; fissure inarticulated.

Observations. Not having obtained a complete specimen, I am unable to give a perfect figure of this species. Among the fractured pieces are two which, by two or three rapid turns, form nearly a complete apex. In some, transverse septa, as mentioned by Lamarck, are found. These are very thin and hemispherical, the convex side being towards the apex. In some fragments the fissure is closed on the inside. I presume this takes place below the upper septum; but I cannot decide upon the few specimens in my possession. The furrows on some specimens are very perceptible, on others obsolete. One of the fragments is

beautifully sculptured by some parasitic animal, so as to resemble, in some degree, the net work of a *Flustra*. It is entirely covered with this carved work, and at the first view I thought this made it specifically different. A further examination, however, proved the depredator to have no particular preference to species or genera, his workmanship being on many other shells.

I am not aware that this genus has been observed in the strata of Great Britain. In the admirable tables of M. Deshayes, appended to the third volume of Lyell's Principles of Geology, we have six species, five of which are found in the Paris basin, the Eocene of Mr Lyell.

The genus has not, to my knowledge, before been observed in any of the formations of our country.

FAMILY MALDANIA.

GENUS DENTALIUM. *Linnaeus*.

D. alternatum. Plate 1. Fig. 2.

Description. Shell very slightly curved, with about sixteen longitudinal ribs alternating with as many smaller ones; near the base furnished with irregular lines of growth; aperture round.

Length about 1 and 3-4ths inches.

Observations. The alternation of larger and smaller ribs seems to distinguish this species; except from that of a living one, the *dentalis* of Lamarck, which is not so robust a shell, while the cardinal ribs are larger. Var. B. (fossil) I have not seen, but “*costis majoribus planulatus*” renders it different. It differs in the ribs entirely from the *attenuatum* (Say), and is a thicker shell. In some specimens the alternations are not entirely regular.

D. turritum. Plate 1. Fig. 3.

Description. Shell slightly curved, smooth, polished, rather thin; posterior termination furnished with four turret-like appendages; aperture round.

Observations. A single specimen only of this curious species has come under my notice. The turreted form of the posterior or smaller termination does not seem to have been noticed in any of the ten species described by Sowerby, nor in the twenty-one by Lamarck. The space between the turrets is festoon like. This remarkable termination eminently distinguishes it from all other species yet described.

The smaller figure is of the size of nature.

In Great Britain fourteen species have been obtained from the Lias to the Crag. Four are mentioned by Sowerby as being in the London Clay. M. Deshayes's tables give thirty-four, of which thirteen are from the Paris basin,

the Eocene period. In this country Dr Morton has observed casts in the Upper Green Sand of New Jersey and Delaware, and Mr Say one species, the *attenuatum*, in the Tertiary of Maryland.

FAMILY SERPULEA.

GENUS SPIRORBIS. *Lamarck.*

S. tubanella. Plate 1. Fig. 4.

Description. Shell discoidal, concave in the centre, sub-carinate above; whorls about three, contiguous; aperture round and enlarged.

Diam. less than 1-10th of an inch.

Observations. This minute species was found attached to the inner side of the valve of a *Plicatula*. Of eleven specimens thus attached, eight are sinistral and three dextral.

I am not aware of this species having been observed in Great Britain. Lamarck describes one species from Grignon. It has not, I believe, before been observed in the strata of this country.

GENUS SERPULA.

S. ornata. Plate 1. Fig. 5.

Description. Shell granulate, below furnished with three squamose carinæ.

Observations. Having a single specimen only of this species, it is difficult to decide on its characteristics. The beautiful granulations which cover the superior part, and the squamose carinæ will, I presume, be usually if not always found to exist on it. The form, however, of different individuals will most likely differ. The one above described takes one turn to the right, then three to the left, forming a disk, the inferior portion being widely umbilicated. It has some resemblance to the *granulata* (Sowerby), but differs in having carinæ.

Of the twenty-seven species found in England, two only have been discovered in the London Clay. The genus seems to have prevailed more extensively in the chalk and inferior formations. Five species are described by Lamarck, and chiefly from Grignon. In the Upper Green Sand of New Jersey and Delaware, Dr Morton has found one species. In the Tertiary of Maryland, Mr Say observed one, the *granifera*.

CONCHIFERA BIMUSCULOSA.

FAMILY TUBICOLARIA.

GENUS TEREDO. *Linnaeus.*

T. simplex. Plate 1. Fig. 6.

Description. Shell thick, slightly curved, smooth exteriorly, tapering.

Observations. Possessing but two or three fragments of the shell, it is impossible to make a perfect description. It differs from the *navalis* (Lam.) in the substance of the shell being thicker, and from the *tibialis* of Morton in being less thick, the cavity of that shell being very small. It has no transverse striæ like the *antennata* of Sowerby.

In England one species only seems to have been observed, and that by Sowerby in the London Clay. In the Tertiary tables of M. Deshayes we find five species, of which three are from the Paris basin. Dr Morton has, from the Chalk of New Jersey, described a fine species—the *tibialis*.

FAMILY SOLENACEA.

GENUS SOLECURTUS. *Blainville.**S. Blainvillii.* Plate 1. Fig. 7.

Description. Shell trapezoidal, rather compressed, nearly equilateral, transversely and minutely striate, truncate behind; beaks very small; escutcheon long and deeply impressed; teeth two, the anterior one large and erect, the posterior small and oblique; margin entire.

Diam. Length .8, Breadth 1.3, inches

Observations. M. de Blainville has with great propriety divided the genus *Solen*, placing those with the teeth nearly medial under the generic name of *Solecurtis*. Several of Lamarck's fossil *Solenes* fall under this division. One species of the true *Solen* (*S. affinis*, Sowerby) is found in the London Clay. The present species resembles most the *strigilatus* (Lamarck), but differs in being more compressed and less gaping.

Mr Sowerby (Mineral. Conch. Tab. 462) represents a shell very similar to this in form and size, under the name *Sanguinolaria compressa*. In the description the teeth are not mentioned. I should suppose from an examination of the figure that it was a true *Solecurtus*. Mr S. says it belongs strictly to *Azor* of Leach.

I have great gratification in dedicating this species to

M. de Blainville, the founder of the genus; who by his talents and industry has contributed so eminently to the improvement and dissemination of the knowledge of natural history. This tribute to his worth affords me peculiar pleasure, estimating as I do his amiable character and great acquirements.

FAMILY MYARIA.

GENUS ANATINA. *Lamarck.*

A. Claibornensis. Plate 1. Fig. 8.

Description. A portion of the hinge only of this shell has come under my notice, consisting of the apophysis, the point of the beak, and a small part of the dorsal margin behind the beak. The apophysis is elliptical, and small comparatively with the thickness of the valve in that region. The figure is a good representation of the part described, and it will be observed that the substance of the shell is much thicker than any described species. The pearly nacre which distinguishes most of the genus is very observable in this.

I am not aware of this genus having been before observed in a fossil state, and it is to be hoped that the exertions of naturalists now interested in investigating this formation will bring to light perfect specimens of this interesting shell.

FAMILY MACTRACEA.

GENUS MACTRA. *Linnaeus.**M. dentata.* Plate 1. Fig. 9.

Description. Fragments only of this species have come into my possession. Two of them consist of a large portion of the hinge of the two valves. The one represented here is of the left valve, which is remarkable for a small lamellar tooth passing from the point of the beak directly between the cardinal tooth and the cavity of the ligament (fossette). The cardinal tooth is as usual angular, and the anterior portion is obliquely notched. Behind the beak, immediately under the dorsal margin, there exists, apparently, a long groove closed over near to the beak. The right valve is only perfect enough to exhibit the cardinal tooth and anterior portion of the hinge. The anterior portion of this tooth is divided into three distinct parts, all of which are lamellar. The groove on this anterior portion is entirely uncovered, and at the bottom is angular. I cannot with absolute certainty say that these two fractured hinges belong to the same species, but until perfect specimens are obtained they must be so considered. They both have a remarkably thin disk, in proportion to the largeness of the hinge; and the concentric striæ, which are minute, are apparently, on the fracture of the beaks which remain,

precisely the same. The seat of the hinge within the cavity of the beaks forms quite a level plate.

Observations. This is certainly a very curious and interesting hinge, and when we shall be able to see the whole of it in connexion with the other portion of the shell, it may be found convenient to erect it into a new genus.

M. Grayi. Plate 1. Fig. 10.

Description. Shell ovately triangular, solid, nearly equilateral, obtusely angular behind, obscurely striate; beaks rather pointed; cardinal teeth angular; lateral teeth nearly equally produced, crossed by equidistant minute striæ; excavation of the palleal impression small, obtusely angular; posterior and anterior cicatrices deeply impressed; cavity of the valve rather shallow, of the beaks deep and sudden.

Diam. .3,

Length .5,

Breadth .6, of an inch.

Observations. This interesting little species resembles in the transverse striæ of the lateral teeth the *M. arctata* (Conrad) and *M. donacia* (Lamarck), both of which are furnished with striæ on the anterior as well as on the posterior lateral teeth. Lamarck seems not to have observed this highly interesting character, as he has not mentioned it. Mr Conrad only mentions their being on the "posterior lateral tooth." The cavity of the beak has the appearance of a hole made in the solid part beneath the hinge, and possibly may have had a muscular attachment there.

I have had some doubt if these species should remain with the genus *Mastra*, but for the present it is, perhaps,

better they should. They there form a beautiful natural group. While in London last summer, Mr Gray showed me in the British Museum a specimen of the *M. arctata*, the habitat of which he was not before acquainted with, and which he informed me he had described in one of the scientific journals of London eight or ten years previously as an *Erycina*.

Mr Conrad, being now actively engaged in investigating the fossils of some of our southern formations, may be able to throw further light on this subject.

Some European naturalists consider the *Mactra donacia* (Lamarck) as an *Erycina*. I have never seen the *E. cardioides* of Lamarck, the type and only species described by him. Cuvier says the *Erycinæ* approach the *Mactræ*, and are but badly characterised. The same author says "the *Amphidesmæ* appear to approach the *Mactræ*, but they are too imperfectly known to have any distinctive character assigned to them." Lamarck described sixteen species of *Amphidesmæ* in 1819, and as many more have probably been described since. I cannot understand how there can be any difficulty in regard to this genus. The *Amphidesmæ* never have the angular cardinal tooth, so remarkable and striking in the *Mactræ*, and this alone is sufficient to separate them. The chief character by which Lamarck makes the division, viz. the existence of an external as well as internal ligament ("par ce rapport singulier, d'avoir deux ligamens"), cannot be maintained, as many, perhaps all the *Mactræ* have an external ligament, generally small, as well as an internal one; but in the *M. solidissima* (Chemnitz) it is very perceptible, being, in a large specimen, quite half an inch long. The lateral teeth of the *Amphidesmæ* also differ greatly.

In dedicating this species to my friend John Edward Grey, I must take occasion to make my acknowledgements for the advantages derived from the numerous and excellent memoirs which have come from his pen, and for many personal services while in Europe.

M. pygmæa. Plate 1. Fig. 11.

Description. Shell triangular, very thin, nearly equilateral, somewhat inflated, more produced before than behind, very indistinctly striate, shining; beaks rather elevated, pointed; cardinal teeth large; lateral teeth small; cavity of the beaks wide and deep.

Diam. 3-20ths, Length 4-20ths, Breadth 7-20ths, of an inch.

Observations. This small species is remarkable for being more produced before than behind. In this respect it differs from the *lateralis* of Say, to which it has some resemblance, though smaller. Immediately at the angle of the cardinal tooth, and below the point of the beak, there is a small apophysis, which I have not observed in other species. In the specimens of my cabinet, the muscular impressions cannot be perceived with a common microscope.

The genus *Mastra* does not seem to have been noticed in England below the Crag. M. Al. Brogniart (Terrains du Vicentin) describes *Mastra? erebea* and *Mastra? sirena* from the calcaréo-trappeens of the Val-Ronca. This I believe belongs to his Terrain Thelassique, equivalent to the Tertiary. He has, however, some doubts of their being

true *Mactra*. From the description and figures, I should not hesitate to abstract them from that genus. M. De-shayes gives fourteen species in his Tertiary Tables, six are from the Miocene of Bourdeaux and Dax. In this country, Mr Say seems first to have observed it in the Tertiary of Maryland.* More recently Mr Conrad has discovered in the same formation two new species, *M. ponderosa*, at St Mary's river, Maryland, and *M. delumbis*, at St James's river, near Smithfield, Virginia.

FAMILY CORBULEA.

GENUS CORBULA. *Brugiere*.

C. Alabamiensis. Plate 1. Fig. 12.

Description. Shell inflated, triangular-ovate, angular behind, transversely and finely striate, inequilateral, very inequivalve, anterior part the larger; beaks incurved and rather pointed; tooth of the right valve large, pointed and fitting under the beak of the left valve; posterior basal margin straight or slightly emarginated; the two great cicatrices distinctly impressed; cavity of the valves deep.

Diam. 7-20ths, Length .4, Breadth .7, of an inch.

Observations. This is the largest species I have seen from our formations. It has a strong resemblance to *C.*

* Journal of the Academy of Natural Sciences of Philadelphia, vol. 4, p. 152.

revoluta (Sowerby), but seems to differ in the angle of the posterior part.

C. Murchisonii. Plate 1. Fig. 13.

Description. Shell much inflated, triangular, subbiangulate behind, nearly equilateral, very inequivalve; right valve covered with regular, large, transverse ribs, which terminate at the sharp carina of the umbonial slope; left valve smooth or slightly wrinkled, with two or three obscure ribs passing from the beak to the basal margin, and a linear umbonial slope, posterior to which there is a deep fold; beaks very large and incurved; tooth and pit of the left valve large; posterior slope truncate, furnished with a double carina on the right valve and a single carina and fold on the left. Cicatrices not distinctly impressed; cavity of the beaks very deep.

Diam. .3,

Length .5,

Breadth .6, of an inch.

Observations. I have peculiar pleasure in dedicating this curious and beautiful species to the late president of the Geological Society of London, who, by his numerous and excellent papers on geology, has eminently contributed to promote a knowledge of his favourite science. The *Murchisonii* is remarkable for the great disparity of the size of its valves, and their total dissimilarity. It has some resemblance to the *elegans* (Sowerby).

C. gibbosa. Plate 1. Fig. 14.

Description. Shell very transverse, somewhat inflated, nearly equilateral, very inequivalve, on the right valve

transversely and distinctly striate, on the left valve transversely and minutely striate; beaks elevated, incurved; umbonial slope with a double carina on the right valve, on the left a single carina and indistinct fold. Cicatrices not distinctly marked; cavity of the beaks rather deep.

Diam. .2, Length .3, Breadth .5, of an inch.

Observations. This species has some resemblance to the *Murchisonii*, but differs in being more transverse, in being more produced behind, in having a more obtuse carina, and in being less inflated.

C. compressa. Plate 1. Fig. 15.

Description. Shell triangular-ovate, compressed, equilateral, inequivalve, concentrically and finely striate on both valves; beaks slightly elevated, incurved; umbonial slope with a double carina on the right valve, and a single one on the left; cicatrices not distinctly marked; cavity of the beaks shallow.

Diam. .1, Length .2, Breadth 5-20ths, of an inch.

Observations. Not easily confounded with the preceding species, being smaller and having both valves similarly striate.

The *Corbulæ* seem to pervade most of the formations from the Mountain Limestone to the Crag. Mr Sowerby describes one (the *nitida*) from the Upper Freshwater of the

Isle of Wight, and three from the London Clay, of which the bed from which the above were obtained is the equivalent in Alabama. Eighteen species in all have been observed in the various formations of Great Britain. In the Tertiary Tables of M. Deshayes we have thirty-five species, twenty-one of which are found in the Paris basin (the Eocene). In this country Mr Say has described three from the Tertiary of Maryland, and Mr Conrad one from the Tertiary of Claiborne.

FAMILY LITHOPHAGA.

GENUS BYSSOMIA. *Cuvier.*

B. petricoloides. Plate 1. Fig. 16.

Description. Shell subcylindrical, very thin, very transverse, indistinctly striate, on the posterior part obliquely and obsoletely folded; beaks scarcely perceptible; posterior and anterior cicatrices perceptible.

Diam. Length .1, Breadth .3, of an inch.

Observations. With much doubt I have placed this shell in Cuvier's genus *Byssomia*. It agrees better with his description of that genus than any one I know.* Unfortunately I obtained but a single valve, and that is imper-

* He says the shell is oblong, and has no "marked tooth," and that it penetrates into stone, coral, &c.

fect. It has a strong resemblance to *Petricola pholadiformis* (Lamarck) (*P. fornicata*, Say), but is to appearance entirely without teeth, having several irregular folds about the beak. It differs also in the exterior folds or ribs, which are, in the *pholadiformis*, marked and situated on the anterior part.

FAMILY NYMPHACEA.

GENUS EGERIA. (*Nobis.*)

Description. Shell subrotund or subtriangular ; margin sometimes crenulate ; hinge variable, sometimes with two lateral teeth ; cardinal teeth two in each valve, diverging, one bifid ; ligament external.

Observations. Unable to place a considerable group of shells, bearing in the cardinal teeth the same character, in any genus with which I am acquainted, I propose to found a new genus for them, the proper place of which would be between *Sanguinolaria* and *Psammobia*. The cardinal teeth have some resemblance to the *Lutricola* of Blainville, but that able naturalist does not mention a bifid tooth, nor is it so figured in his work. Although there is considerable dissimilarity in the form of the several species of this genus, some being more round and others triangular, the two diverging cardinal teeth, one being bifid, will always be found characteristic of the genus.

E. rotunda. Plate 1. Fig. 17.

Description. Shell rotund, compressed, angular above, subequilateral, minutely and concentrically striate; substance of the shell thick; beaks elevated, pointed; cicatrices deeply impressed, several visible in the centre of the cavity of the beaks; cavity of the shell shallow, rugose, cavity of the beaks subangular; margin entire.

Diam. .3, Length .9, Breadth .9, of an inch.

Observations. The resemblance in outline between this species and the *nana*, hereafter to be described, is very great. It may be distinguished, however, from it by its finer concentric striæ, and its larger size. The *nana* is always more oblique. The figure represents the usual size, but it is sometimes found one third larger.

E. inflata. Plate 1. Fig. 18.

Description. Shell subrotund, rather transverse, inflated, subequilateral, very finely and concentrically striate; substance of the shell very thin; beaks rather elevated; posterior slope furnished with an indistinct fold. Cicatrices scarcely perceptible; cavity of the shell much excavated, of the beak deep and rounded; margin entire.

Diam. .2, Length 7-20ths, Breadth 7-20ths, of an inch.

Observations. Differs from the *rotunda* in being more transverse, in the substance of the shell being much thin-

ner, and in being more inflated. The dorsal margin is but slightly curved.

E. nitens. Plate 1. Fig. 19.

Description. Shell subelliptical, obliquely transverse, inequilateral, the anterior portion being much the larger, rather compressed, smooth and shining; substance of the shell very thin; posterior slope lightly folded; beaks elevated, pointed; cicatrices scarcely perceptible; cavity of the shell not deep, of the beak rather deep; margin entire.

Diam. .1, Length 5-20ths, Breadth 6-20ths, of an inch.

Observations. At first view this species might be taken for the *inflata*. On examination it will be easily distinguished by its polish, its obliquity, and particularly by the great disparity of the size of the anterior portion of the shell, the *inflata* being nearly equilateral.

E. triangulata. Plate 1. Fig. 20.

Description. Shell triangular, inequilateral, smooth, obtusely angular before, acutely angular at top, gibbous over the umbo—anterior to which it is flattened; substance of the shell rather thin; posterior and anterior slopes flattened; beaks elevated, pointed, incurved; basal margin emarginate; cicatrices not perceptible; cavity of the shell deep in the superior part—of the beak deep and angular; inferior portion of the margin finely crenulate.

Diam. . . . Length .1, Breadth 1.2. inches

Observations. A single valve of this interesting species has come into my possession. It is the left one. Its beautiful form eminently distinguishes it. The exterior portion of the valve is not perfect, and characters not observed on this specimen may be, perhaps, found on perfect ones.

E. Bucklandii. Plate 1. Fig. 21.

Description. Shell subtriangular, somewhat inflated, inequilateral, polished, obtusely angular before and at top; substance of the shell rather thin; posterior and anterior slopes somewhat flattened; beaks somewhat elevated, pointed, incurved; cavity of the shell not very deep; inferior portion of the margin finely crenulate.

Diam. Length .7, Breadth 1, inch.

Observations. Like the last described, a single valve of this beautiful species only has been found. It was taken out of a mass in about a dozen pieces and reconstructed. It resembles the *triangulata* in many of its characters, but is more transverse, and is neither flat nor gibbous on the exterior. In outline, it has some resemblance to a *Donax*.

In dedicating this species to the distinguished author of the "Reliquiæ Diluvianæ," I will take the opportunity to make my acknowledgements for the pleasure and advantages derived from his various writings. Few geologists of Europe have, with the same success, cultivated the

science of geology, and very few have laboured more successfully to add new facts to establish its philosophy.

E. subtrigonia. Plate 1. Fig. 22.

Description. Shell subtriangular, somewhat inflated, inequilateral, polished, obtusely angular before and at top; substance of the shell thin; anterior slope furnished with a small fold; beaks slightly elevated, pointed; cicatrices perceptible; cavity of the shell rather shallow; inferior portion of the margin minutely crenulate.

Diam. .2, Length .3, Breadth .5, of an inch.

Observations. There is a very close resemblance between this and the *Bucklandii*, and had there not been so much disparity in the size of the shell and thickness of the valve, I should not have been disposed to separate them. The valves of three specimens are before me. They are of the same size, and have every appearance of being adult.

E. veneriformis. Plate 1. Fig. 23.

Description. Shell ovately triangular, transverse, rather compressed, inequilateral, polished; substance of the shell thin; beaks pointed; cicatrices perceptible; cavity of the beaks shallow; inferior portion of the margin very minutely crenulate.

Diam. 3-20ths, Length .2, Breadth .3, of an inch.

Observations. This small species has a close resemblance to the last described. It differs chiefly in size and

in being more equilateral. It is very common in this stratum.

E. ovalis. Plate 1. Fig. 24.

Description. Shell transversely elliptical, compressed, very inequilateral, furnished with two lamellar lateral teeth, covered with minute concentric striæ, which, terminating at the anterior slope, are replaced by larger ones which there interlock; substance of the shell very thin; beaks small and pointed; cavity of the shell very shallow; margin entire.

Diam. .1, Length .2, Breadth .4, of an inch.

Observations. This beautiful little species differs much from the four last described. The cardinal teeth are the same, but this is furnished with a small lamellar tooth diverging on each side of the cardinal teeth. The termination of the concentric striæ, which pass from the posterior slope, interlocking with those which cover the anterior slope, is very remarkable.

E. plana. Plate 1. Fig. 25.

Description. Shell scaleniform, very compressed, transverse, very inequilateral, smooth and shining, furnished with two lamellar lateral teeth; substance of the shell very thin; beaks very small and pointed; cavity of the shell extremely shallow; margin entire.

Diam. nearly .1, Length .2, Breadth 7-20ths, of an inch.

Observations. Differs from the *ovalis*, which it most resembles, in being smooth, more compressed and more angular.

E. nana. Plate 1. Fig. 26.

Description. Shell rotundo-oblique, compressed, angular above, subequilateral, concentrically striate; substance of the shell rather thin; beaks pointed; cicatrices imperceptible; cavity of the shell shallow—of the beak angular; margin entire.

Diam. .1, Length 5-20ths, Breadth 5-20ths, of an inch.

Observations. Closely resembles the *rotunda*. It has, however, somewhat larger concentric striæ—is a much smaller shell, and is more oblique.

GENUS LUCINA. *Lamarck.*

L. compressa. Plate 1. Fig. 27.

Description. Shell subrotund, much compressed, very finely and concentrically striate, equilateral; beaks small and pointed; lunule small and cordate; anterior cicatrix deeply impressed, extending nearly to the basal margin; pallear impression irregular; cavity of the shell shallow and rough, having an impressed furrow across its centre; margin entire.

Diam. .6, Length 1.5, Breadth 1.7, of an inch.

Observations. This species is very fragile, scarcely bear-

ing to be moved. Its rough interior and large deeply impressed anterior cicatrix are remarkable.

L. rotunda. Plate 1. Fig. 28.

Description. Shell orbicular, compressed, equilateral, concentrically and finely striate, flattish over the umbones, folded before; substance of the shell thick; lunule small, lanceolate; beaks very small, pointed, recurved; cardinal teeth indistinct; cicatrices impressed, the anterior one rather long; lines of growth numerous near the margin; cavity of the shell very shallow, having rather a large furrow across its centre; margin entire.

Diam. .6,

Length 1.1,

Breadth 1.1, of an inch.

Observations. Single valves of two individuals only have come into my possession. Its orbicular form and beautiful concentric striæ distinguish this species. In these two specimens there are no marks of growth except near to the margin, where on one specimen there are four, on the other seven. These cause a thickening of the margin.

L. cornuta. Plate 1. Fig. 29.

Description. Shell orbicular, ventricose, inequilateral, concentrically striate, angular before, folded and emarginate behind; substance of the shell thick; lunule impressed, being bounded by a ridge; beaks elevated, pointed, recurved; anterior lateral tooth nearly round, equidistant between the beak and angle; posterior lateral tooth somewhat compressed, equidistant between the beak and fold;

the two great cicatrices raised and very perceptible, the anterior one long ; lines of growth three or four, and very marked ; cavity of the shell deep and rounded, having an impressed furrow across the centre ; margin crenulate.

Diam. . . . Length 9-20ths, Breadth 9-20ths, of an inch.

Observations. A single valve only of this beautiful and interesting species has been obtained by me. It does not closely resemble any species recent or fossil which I have seen. The horn or protruding angle on the anterior margin, formed by the bounding ridge of the lunule, at once distinguishes it. The fold or furrow on the posterior part, passing from the beak to the posterior basal margin, forms here a remarkable emargination.

L. impressa. Plate 1. Fig. 30.

Description. Shell lenticular, somewhat inflated, nearly equilateral, concentrically striated, folded and emarginate behind ; substance of the shell rather thin ; lunule very small and deeply impressed ; beaks recurved ; the two great cicatrices impressed ; lines of growth numerous ; cavity of the shell rather deep and rounded, having no visible furrow ; margin crenulate.

Diam. .2, Length .3, Breadth .3, of an inch.

Observations. This species has some resemblance to the *cornuta*, but cannot be easily confounded with it. The horn of the one and the deeply impressed lunule of the other eminently distinguish them. This little lunule is

so deeply impressed immediately before the beak, as to give a curve to the margin resembling a fracture. The *impressa* resembles very closely the figure of *L. mitis* (Sowerby). He says in his description, "no lateral teeth." This species has them most distinctly marked. He describes the margin as crenulate—ours is beautifully so.

L. papyracea. Plate 1. Fig. 31.

Description. Shell orbicular, lenticular, somewhat inflated, concentrically and finely striated, slightly folded behind and submarginate; substance of the shell thin; lunule cordate; beaks rather pointed; lateral teeth scarcely perceptible; anterior cicatrix short; lines of growth indistinctly marked; cavity of the shell rather shallow; margin crenulate.

Diam. 3-20ths, Length 7-20ths, Breadth 7-20ths, of an inch.

Observations. This species has a general resemblance to the *impressa*, but differs in being rather less inflated and in being without the deep impression before the beaks. The posterior fold of the *impressa* is greater, and the lateral teeth are much larger. In the present species the striæ decrease in number on the posterior part and there become squamose.

L. lunata. Plate 1. Fig. 32.

Description. Shell anteriorly oblique, inequilateral, inflated, concentrically striated and furrowed; substance of the shell thick; lunule broadly cordate, beaks elevated,

recurved ; cardinal and lateral teeth rounded ; cicatrices not deeply impressed ; the lines of growth numerous and deeply furrowed, causing a crescent like appearance ; cavity of the shell deep—of the beaks deep and rounded, having no visible furrow ; margin crenulate.

Diam. .2, Length .3, Breadth .2, of an inch.

Observations. Differs from *impressa* in size, obliquity, striæ, and the deeply seated lunule.

Seven species have been noticed in the strata of Great Britain, from the Great Oolite to the Crag—one only in the London Clay. In M. Deshayes's valuable Tertiary Tables we find fifty-nine, of which thirty-one are from the Paris basin (Eocene). Twelve are from Bourdeaux (Miocene). Mr Say has observed five in the Tertiary of Maryland, and Mr Conrad two from the Tertiary of Claiborne.

GENUS GRATELUPIA. *Des Moulins.*

G. Moulinsii. Plate 2. Fig. 33.

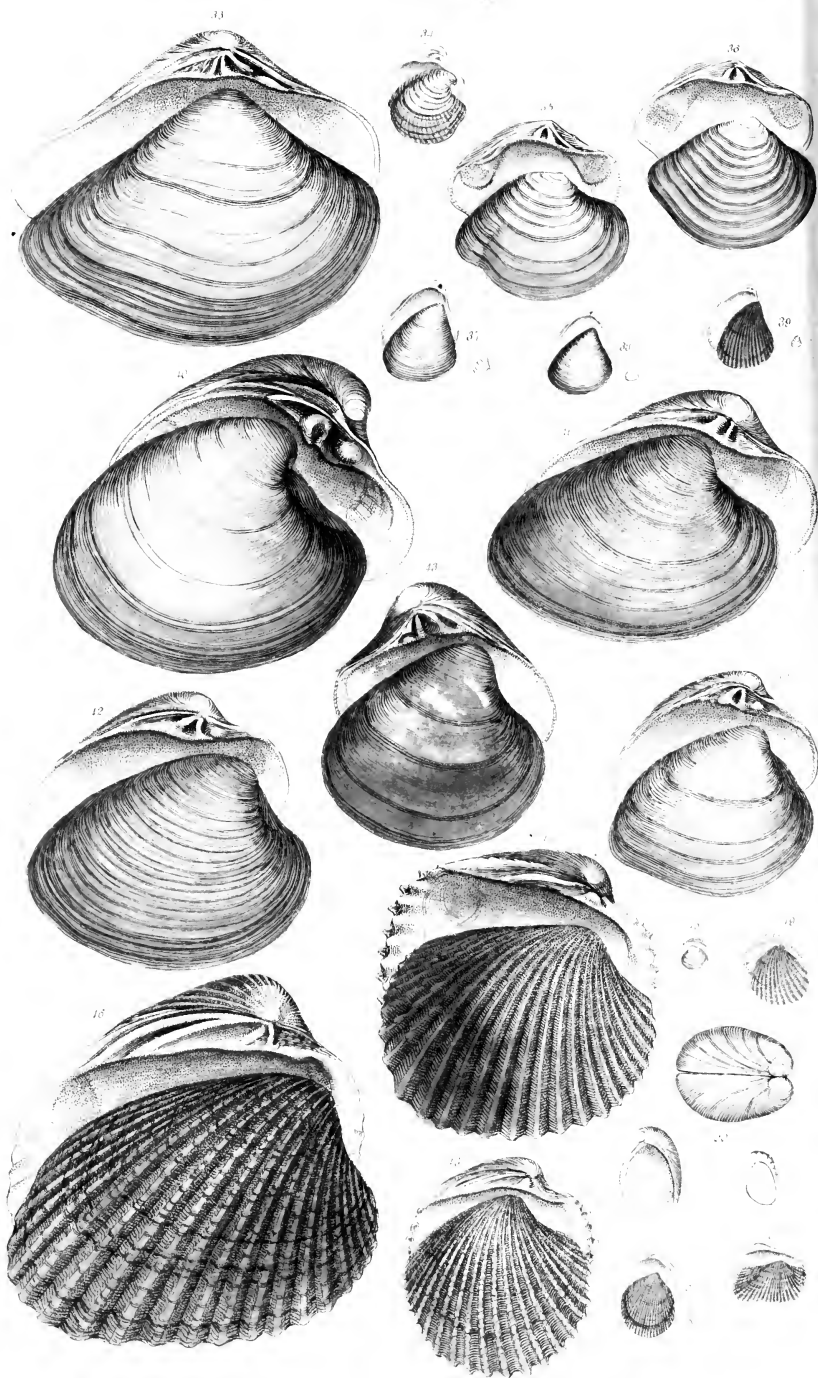
Description. Shell subtriangular, inflated, gibbous over the umbo, very finely and transversely striate, nearly equilateral ; obtusely angular behind, subemarginate on posterior basal margin ; lunule large and lanceolate ; margin entire.

Diam. 1, Length 1.4, Breadth 1.9, of an inch.

Observations. The genus *Gratelupia* was established in 1827, by M. Charles des Moulins, president of the Linnæan Society of Bourdeaux, and published in the second volume of the Transactions of the Society. The name of his distinguished friend, Dr Grateloup, was given to the genus, a single species of which only has heretofore been made known, the *G. donaciformis*. I have great pleasure in now having it in my power to dedicate a new species to the founder of the genus, who has cultivated, with such eminent success, the rich formations of the south of France, and added so much to the labours of Basterot.

It is not quite so transverse as the *donaciformis*, nor is the basal margin quite so straight—it differs also in being gibbous over the umbones and in having comparatively a small excavation of the palleal impression, which, in the other species, is large, extending two-thirds of the distance between the two great muscular impressions. The small additional teeth which distinguish this genus from the *Cytherea*, are not in this species so perfectly defined as in the *donaciformis*. They are more irregularly cut up into crenulations. M. des Moulins places his genus between the genera *Lucina* and *Donax*. The structure of its teeth would induce me to think it ought to be placed before the genus *Cytherea*. The lateral tooth is like that of the *Cytherea*, but more removed.

The genus *Gratelupia* has been observed, heretofore, only at Bourdeaux, where a single species has been observed by the founder of the genus in the Miocene.



1 GRATELUPIA
 2 ANARTIF

Mouliana
recurvata
Vellum
calata
patula
membr.
ovata

16 CYTHERIA
 17
 18
 19
 20

21
 22
 23
 24
 25

16 VENERICARDIA
 17
 18
 19
 20 HYPPARIA
 21 MYOPARO
 22 ARCA

Hypparia
Myoparo
Arca
Arca
Arca
Arca

GENUS ASTARTE. *Sowerby.* (*Crassina of Lamarck.*)*A. recurva.* Plate 2. Fig. 34.

Description. Shell subrotund, angular before, emarginate behind, deeply emarginate before the beaks, rather compressed, concentrically and largely striate, deeply folded behind; substance of the shell rather thick; beaks very much elevated and recurved; lunule large, deeply impressed, cordate; escutcheon long—lanceolate; posterior slope bicarinate; teeth obliquely curved; cicatrices impressed; margin finely crenulate.

Diam. .2, Length .4, Breadth .4, of an inch.

Observations. I have seen no species of this genus with so elevated and recurved a beak as this. It is remarkable for its curved teeth, the very deep impression of the lunule, which, together with the recurvature of the beak, causes the point of the latter to be quite hooked. The deep fold or furrow, behind, forms on its edges sharp ridges, which are imbricate. In one specimen, I observed longitudinal striæ diverging from the beaks and nearly reaching the margin.

A. Nicklinii. Plate 2. Fig. 35.

Description. Shell transversely elliptical, subangular behind, emarginate at posterior basal margin, concentrically and largely ribbed; beaks compressed, pointed; lunule

lanceolate, excavated, escutcheon long and excavated; nymph small and deeply seated; teeth small; anterior and posterior cicatrices placed on a raised seat; palleal cicatrix passing between the two great cicatrices in a gentle curve; margin crenulate.

Diam. .4,

Length .7,

Breadth .9, of an inch.

Observations. This interesting and remarkable species cannot easily be confounded with any other with which I am acquainted, except that which follows. Its oval form, flat beaks and large transverse folds or ribs, are remarkable.

In dedicating it to my friend, P. H. Nicklin, I have great pleasure in acknowledging my obligations to him, for his kind assistance in occasional difficult points.

A. sulcata. Plate 2. Fig. 36.

Description. This species is so precisely similar to the last, with the exception of a marginal furrow, that I have thought it unnecessary to recapitulate the description. The *Nicklinii* is beautifully crenulate on the margin, while the *sulcata* is furnished with a margin, along whose inner edge a perfect furrow passes from the anterior to the posterior part of the hinge. When very young the specimens are almost perfectly flat, and might, for this reason, easily be taken for a different species.

A. parva. Plate 2. Fig. 37.

Description. Shell triangular, rounded below, acutely angular above, compressed, equilateral, concentrically and closely striate; beaks elevated, pointed; lunule large, lanceolate; cardinal teeth small, the posterior margin furnished with a long straight lateral one; cicatrices scarcely visible; margin crenulate.

Diam. Length .1, Breadth .1, of an inch.

The smaller figure is of the size of nature.

Observations. Although this and the two following species do not accord entirely with Sowerby's generic description of *Astarte*, nor that of Lamarck under the name of *Crassina*, inasmuch as these have a long, straight, lateral tooth; I have preferred placing them there, as they agree in all the other generic characters, thinking it unnecessary to make a new genus for them.

The species above described is more elevated and more acutely angular at the beaks than the others. Its striæ are much finer, and it is supposed to be emarginate immediately under the point of the beaks.

A. minor. Plate 2. Fig. 38.

Description. Shell triangular, rounded below, angular above, compressed, equilateral, concentrically and widely striate; beaks elevated, pointed; lunule large, lanceolate; cardinal teeth small, the posterior margin furnished with

a long straight lateral tooth; cicatrices scarcely visible; margin entire?

Diam. 1-20th, Length nearly .1, Breadth nearly .1, of an inch.

The smaller figure is of the size of nature.

Observations. This species at first sight might easily be mistaken for the *parva*. The microscope will, however, show very characteristic differences. It is less angular above; the transverse striæ are much further removed; it might be said to be sulcate. All the specimens I have (five) are without a crenulated margin. More perfect specimens may, nevertheless, exhibit this character.

A. minutissima. Plate 2. Fig. 39.

Description. Shell scaleniform, acutely angular above, rather compressed, oblique, ribbed longitudinally; beaks elevated, pointed; lunule very large, cordate; cardinal teeth small, the posterior margin furnished with a long straight lateral one; cicatrices scarcely visible; margin largely crenulate.

Diam. . . . Length 1-20th, Breadth 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. Differs from the two preceding in size, and may at once be distinguished by its longitudinal ribs, the others being transversely striate.

One species only seems to have been found in the beds of the London Clay in England, the *rugatus* of Sowerby. From the Lias to the Crag twenty-eight species in all have

been observed, eight being from the Crag. Lamarck does not mention any fossil species. M. Deshayes gives nineteen species in his Tertiary Tables. Mr Say has noticed two species in the Tertiary of Maryland; Mr Conrad two in that of Claiborne.

FAMILY CONCHÆ.

GENUS CYTHEREA. *Lamarck.*

C. globosa. Plate 2. Fig. 40.

Description. Shell very much inflated, subrotund, very finely and transversely striate; swollen over the umbones; lunule widely and beautifully cordate; beaks very large, recurved; teeth elevated and disposed to be conical; excavation of the palleal impression conical; cavity of the shell very deep and rounded; margin entire.

Diam. 1.1,

Length 1.3,

Breadth 1.6, of an inch.

Observations. This is perhaps the most globose of all the species yet known. It is remarkable for its capacity and its high recurved beaks, in which it has some resemblance to the genus *Isocardia*. It is this which gives the impression of the ligament a curve of small radius. The excavation of the palleal impression is more angular than in any species I have noticed. The two central teeth in the right valve are erect and close, with a deep cleft between them. On the edge of the right valve there is a

groove passing from the termination of the ligament to the posterior margin.

C. comis. Plate 2. Fig. 41.

Description. Shell inflated, elliptical, smooth; beaks large; lunule broad and cordate; teeth elevated and disposed to be conical; excavation of the palléal impression rather deep and sub-biangular; cavity of the shell deep; margin entire.

Diam. .9,

Length 1.1,

Breadth 1.5, of an inch.

Observations. Differs from the *C. globosa* in being more transverse, less capacious, in having smaller beaks and smooth exterior. About the umbones it is somewhat gibbous.

C. Hydii. Plate 2. Fig. 42.

Description. Shell somewhat inflated, subovate, transversely and thickly folded; beaks rather elevated and minutely folded; lunule cordate; teeth rather elevated and compressed; excavation of the palléal impression sub-biangular; cavity of the shell rather deep; margin entire.

Diam. .7,

Length 1.2,

Breadth 1.4, of an inch.

Observations. This species is less inflated than the *comis*, and differs from it in having beautiful folds over the beaks and the whole disk.

I have great gratification in placing the name of one of our most distinguished conchologists to this shell. Among

the first to collect and arrange systematically the shells of our country, he has formed one of the finest cabinets in it.

C. subcrassa. Plate 2. Fig. 43.

Description. Shell somewhat inflated, subtriangular, concentrically striate, thick about the region of the hinge; substance of the shell thick; beaks thick and elevated; lunule cordate, indistinct; teeth rather elevated and compressed; excavation of the palleal impression rather small and roundish; cavity of the shell deep and rounded; margin crenulate.

Diam. . . . Length 1.1, Breadth 1.2, of an inch.

Observations. This shell most resembles the *trigoniata* herein described. It is like that shell in outline, but is thicker, and differs also in having a crenulated margin.

C. trigoniata. Plate 2. Fig. 44.

Description. Shell somewhat inflated, triangular, concentrically and minutely striate; substance of the shell rather thick; beaks moderately elevated and recurved; lunule long, elliptical; teeth moderately large; excavation of the palleal impression deep and rounded; cavity of the shell deep, subangular; margin entire.

Diam. .6, Length .9, Breadth 1.1, of an inch.

Observations. In outline the *trigoniata* resembles closely the *subcrassa*. It is, however, less thick in the substance of the shell, has much finer striæ, and is entirely without crenulations on the margin.

C. minima. Plate 2. Fig. 45.

Description. Shell subrotund, angular above, subequilateral, concentrically and very minutely striate; lunule large, elliptical; beaks somewhat elevated, pointed, compressed; cavity of the shell deep and rounded, margin entire.

Diam. Length .1, Breadth .1, of an inch.

Observations. A single valve only of this little *Cytherea* has been observed by me. It may possibly be the young of the *trigoniata*. This specimen is, however, more equilateral and the striæ are more minute.

Of this genus three species have been observed in Great Britain, one of which is from the London Clay. In M. Deshayes's Tertiary Tables we find fifty-nine species. Twenty-two of these are from the Paris basin, and eighteen from Dax (Miscene period). Mr Say has described two species from the Tertiary of Maryland, and Mr Conrad one from the same state.

GENUS VENERICARDIA. *Lamarck.**V. transversa.* Plate 2. Fig. 46.

Description. Shell very transverse, elliptical, inflated, very inequilateral; obliquely ribbed; substance of the

shell thick ; lunule very small, deeply impressed, cordate ; beaks rather elevated, recurved ; ribs about twenty-seven, on the anterior part furnished with somewhat distant tubercles ; teeth transverse ; cicatrices impressed ; cavity of the shell deep, oblique ; margin very largely crenulate.

Diam. 1.3, Length 1.4, Breadth 1.9, of an inch.

Observations. This species is perhaps most remarkable for its transverseness and its large knotted ribs. Those of the posterior part are rounded. It most resembles the *Sillimani*, but is more transverse.

V. Sillimani. Plate 2. Fig. 47.

Description. Shell rather transverse, inflated, inequilateral, covered with longitudinal, elevated ribs ; substance of the shell thick ; lunule very small, very transverse, and very deeply impressed ; beaks rather elevated, recurved ; ribs, about twenty-seven, sharp and imbricate behind—obtuse and tuberculate before ; teeth nearly transverse ; cicatrices slightly impressed ; cavity of the shell deep ; margin largely crenulate.

Diam. 1, Length 1.1, Breadth 1.4, of an inch.

Observations. In many of its characters this species closely resembles the *transversa*. But being less transverse, having the posterior ribs more elevated and somewhat imbricate, I am induced to separate it. In dedicating it to my friend Professor Silliman, I do myself a peculiar pleasure. His great acquirements and successful investi-

gations in the sciences, have, at home and abroad, won for him a deserved reputation such as few acquire.

V. rotunda. Plate 1. Fig. 48.

Description. Shell rotund, inequilateral, slightly inflated, longitudinally and closely ribbed; substance of the shell rather thick; lunule small, ovately cordate; beaks slightly elevated, recurved; ribs about twenty-six, and furnished with closely set arched scales; teeth rather oblique; cicatrices rather impressed; cavity of the shell somewhat deep and rounded; margin rather largely crenulate.

Diam. .6,

Length 1,

Breadth 1, inch.

Observations. This fine species is remarkable for its beautifully furnished ribs, which are so thickly set with arched scales, as almost to cause them to lie over each other. It differs from the *Sillimani* in its form, size and ribs.

V. parva. Plate 2. Fig. 49.

Description. Shell subtriangular, rounded below, angular above, inflated, equilateral, longitudinally and closely ribbed; substance of the shell thick; lunule large, cordate, slightly impressed; beaks elevated, large; ribs about twenty, transversely and thickly crenulate; teeth oblique; cicatrices slightly impressed; cavity of the shell rather deep; margin largely crenulate.

Diam. .2.

Length .3,

Breadth .3, of an inch.

The figure is slightly enlarged.

Observations. A beautiful little species, and likely to be taken for the young of the *rotundata*. It has, however, a less number of ribs, is more longitudinal, has a thicker shell, and has more elevated beaks—the hinge is remarkably thick.

The genus *Venericardia* does not seem to exist in the older formations. Mr Mantell mentions one in the Chalk of Sussex, but has not determined the species. The *V. Brogniarti* is stated to be from the Sandstone.* Six are mentioned by Mr Sowerby as existing in the London Clay, and four are by him ascribed to the Crag. The well known *V. planicosta* exists in the London and Paris basins. M. Deshayes, uniting the *Venericardia* and *Cardita*, gives fifty for the Tertiary of Europe. Mr Conrad gives for American localities of this species, Maryland and Alabama.†

In this country three species only have, heretofore, I believe, been observed, the *granulata* of Say, from the Tertiary of Maryland—the *planicosta* of Lamarek, and the *Blandingi*, found by Dr Blanding in the Tertiary of Camden, S. C.

* Geo. Trans. vol. 3, second series.

† See my observations on this species in the Introduction.

FAMILY CARDIACEA.

GENUS HIPPIAGUS.* (*nobis.*)

Description. Shell cordate, inflated, without teeth; beaks large, recurved; margin slightly overwrapping beneath the beak; anterior cicatrix long; posterior cicatrix round.

Observations. I have in vain endeavoured to place this shell in one of the established genera. In its general characters it approaches most closely to the *Isocardia cor*, but cannot be placed in that genus, being destitute of teeth. It bears some resemblance to the genus *Inoceramus* of Sowerby, but the hinge in that genus "closes by a series of oblong fossets," and besides it is very inequivalve. In its natural order, it seems to follow the genus *Isocardia*, and I propose there to place it.

H. isocardioides. Plate 2. Fig. 50.

Description. Shell cordate, much inflated, longitudinal, minutely and longitudinally ribbed, flattened before and behind, ridged along the umbonial slope; substance of the shell rather thick; beaks large, recurved; cicatrices im-

* A Horse Boat.

pressed; cavity of the shell very deep; margin minutely crenulate; nacre somewhat pearly.

Diam. 3-20ths, Length 5-20ths, Breadth 3-20ths, of an inch.

Three views are given, the smallest being of the size of nature.

Observations. Three or four valves only of this curious little shell were received by me. The posterior part is exceedingly flat, resembling in this respect some of the *Cardia*. The depression of the anterior part is between the anterior margin and the beaks; hence the posterior margin differs from it, the one being subangular, the other curved.

GENUS MYOPARO.* (*nobis.*)

Description. Shell cordate, equivalve; beaks recurved; a series of small teeth, transverse to the margin, on each side of the beaks, and placed on the margin; two large cicatrices.

Observations. In its general appearance, this resembles the genus just described, and were it not for the teeth on either side of the beak, it would naturally take its place there. In the outline, and possession of an anterior series of teeth, it approaches the *Catillus* (*C. Lamarckii*) of Blainville,† which, however, has teeth on one side only. The

* A piratical oar-galley.

† Manuel de Malacologie, &c. p. 529.

genus *Pulvinites* of DeFrance, is still further removed, the series of teeth being directly at the apex of the margin, which is there thickened.

P. costatus. Plate 2. Fig. 51.

Description. Shell cordate, somewhat inflated, longitudinal, minutely and longitudinally ribbed; substance of the shell thin; beaks elevated, recurved; cicatrices large; the anterior series of the teeth short, the posterior one long, anterior one longer and narrower; cavity of the shell rather deep; margin very minutely crenulate; nacre pearly under the epidermis.

Diam. .1,

Length .2,

Breadth 3-20ths, of an inch.

Observations. This interesting little species requires a microscope to observe some of its characters. The specimens in the best state of preservation are greenish. The ribs, in some instances, diverge, and are cut by the lines of growth.

FAMILY ARCACEA.

GENUS ARCA. *Linnaeus.*

A. rhomboidella. Plate 2. Fig. 52.

Description. Shell rhomboidal, very inequilateral, compressed at base, longitudinally and closely ribbed; sub-

stance of the shell thin ; beaks small, pointed ; ribs about thirty-three, obsolete tuberculated on the anterior portion ; teeth lamellar, oblique ; cicatrices scarcely perceptible ; cavity of the shell rather shallow ; margin crenulate.

Diam. . . . Length .2, Breadth 7-20ths, of an inch.

Observations. This pretty little species forms, by its parallel sides, nearly a perfect rhomboid. It has some resemblance to the *centenaria* of Say, which is described by him, as well as Mr Conrad, as being “subrhomboidal.” The figures, however, are both trapezoidal, and, therefore, differ in outline from the description. It may also be distinguished by the ribs, the *centenaria* being striate. The figure of Mr Sowerby’s *duplicata* has a close similarity to our shell, but differs in having the “ribs sulcated along the middle.”

The genus *Arca* has been observed in England, as low down as the Carboniferous Limestone. In Sweden and Germany, several species have been observed as low as the Cretaceous and Oolitic Groups. M. Al. Brogniart describes a species (*Pandoris*), from the Calcareo-trapean formation of Vicentin*. M. Deshayes gives us fifty-four species—twenty-three of these are from the Paris basin. From our formations, Mr Say has described three species, all from the Tertiary of Maryland. Mr Conrad has also described three, and observed two others common

* Memoire du Vicentin, &c. page 76.

to our coast, the *transversa* and *ponderosa* of Say. These are from the Tertiary of North Carolina, Virginia and Maryland.

GENUS PECTUNCULUS. *Lamarck.*

P. Broderipii. Plate 3. Fig. 53.

Description. Shell rather oblique, inflated, inequilateral, nearly straight at dorsal margin, with delicate longitudinal linear ribs, cut by very minute transverse striæ; beaks rather elevated; hinge teeth arched and very diminutive in the centre; cicatrices slightly raised; cavity of the shell deep; marginal teeth pointed, small and well defined.

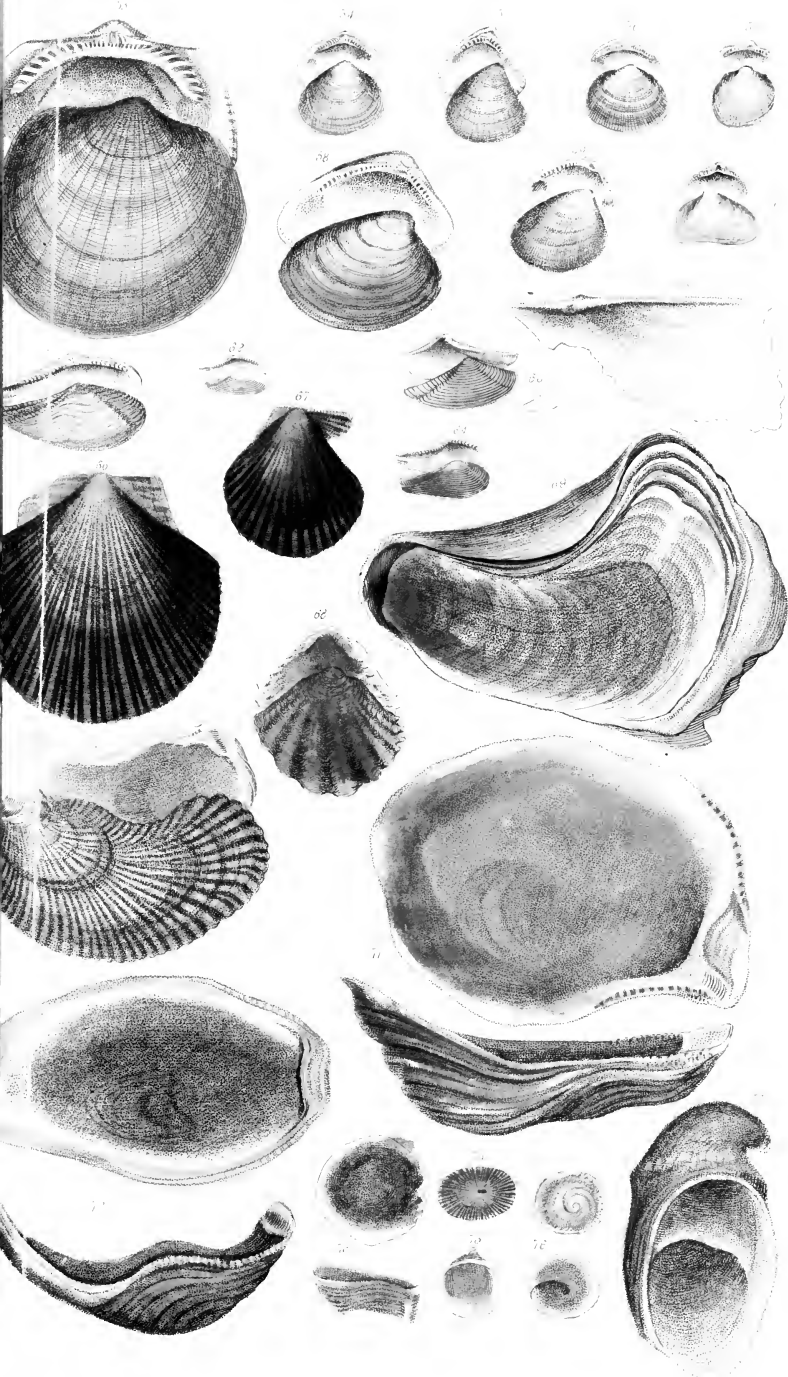
Diam. .9,

Length 1.3,

Breadth 1.4, of an inch.

Observations. This species is, perhaps, most remarkable for its small and beautifully pointed marginal teeth, and the straight line of the dorsal margin. The longitudinal linear ribs, which diverge from the point of the beak and extend to the margin, are beautifully cut by the fine concentric striæ, which interrupt them. This can only be perceived in specimens which are in the best state of preservation. In young specimens, the obliquity does not always exist, and the shell is then equilateral. In perfect specimens, with the assistance of the microscope, the dorsal teeth will be seen to be transversely striate.

In placing the name of so distinguished a conchologist as that of Mr. Broderip to this species, I have great pleasure.



SCALLOPS

Prodeus
minor
ditto
Alipha
ditto
Schizoneura
ocho
picturata
Lucina

62. NUCULA
 63.
 64.
 65. AVICULA
 66. PECTEN
 67.
 68. PLECTYLIS
 69. OSTREA

moda
pub. hercynia
plicata
clathrensis
D. haysii
Lyell
Mant. St.
smithiana

70. OSTREA
 71.
 72.
 73.
 74. FISSURELLA
 75. HIPPIANIX
 76. INFUNDIBULUM
 77. CREMIFERA

Anart. etc.
Itah. unius.
lingua. cav.
inermis
clathrensis
Plum.
trichostoma
ovata. etc.

His valuable contributions to science are too well known to need my observing upon them.

P. minor. Plate 3. Fig. 54.

Description. Shell angular above and round below, nearly equilateral, with minute radiating ribs cut by transverse striæ; beaks rather elevated; hinge teeth arched, large, diminishing only at the anterior and posterior parts of the row; cicatrices impressed; cavity of the shell shallow; marginal teeth small and square.

Diam. .2, Length .4, Breadth 9-20ths, of an inch.

Observations. This diminutive species resembles in some of its characters, the *Broderipii*, but differs from it entirely in the dorsal line and the marginal teeth.

P. deltoideus. Plate 3. Fig. 55.

Description. Shell subtriangular, inequilateral, more rounded before, acutely angular at the beak, with minute longitudinal ribs cut by transverse striæ; beaks elevated, pointed; hinge teeth smaller in the centre; cicatrices impressed; cavity of the shell shallow; marginal teeth rather large and square.

Diam. 5-20ths, Length .4, Breadth .4, of an inch.

Observations. Closely allied to the *P. minor*, this species resembles it in nearly all its characters. It differs in outline, and more particularly in the angle of the dorsal mar-

gin. The anterior part is sometimes entirely straight from the beak to the anterior basal margin.

P. ellipsis. Plate 3. Fig. 56.

Description. Shell transversely elliptical, compressed, inequilateral, concentrically and minutely striate, with small longitudinal rugose ribs, more strongly marked on the posterior and anterior parts; beaks rather elevated, recurved; hinge teeth very small, numerous and scarcely interrupted in the middle; cicatrices impressed; cavity of the shell shallow; margin entire.

Diam. .2, Length 7-20ths, Breadth 9-20ths, of an inch.

Observations. In some of its characters the *ellipsis* closely resembles the *minor*, but is eminently distinguished by the absence of *marginal* crenulations. It is more transverse and has smaller dorsal teeth. Immediately under the beak is a fosset-like impression, which may have been the seat of the ligament. In this it has some resemblance to the *nucula*; but is placed above the arched row of teeth.

P. obliqua. Plate 3. Fig. 57.

Description. Shell oblique, somewhat inflated, very inequilateral, straight at dorsal margin, with minute longitudinal ribs, concentrically folded; folds beautifully sculptured; beaks rather elevated, pointed; hinge teeth few, small, placed on nearly a straight plate, smaller in the middle; cicatrices slightly impressed; cavity of the shell

rather deep ; marginal teeth small on the basal margin—larger anteriorly and posteriorly.

Diam. .2, Length 7-20ths, Breadth 7-20ths, of an inch.

Observations. This very curious and interesting species is remarkable for its obliquity and the sculptured grooves of its folds. At first sight it might be mistaken for the genus *Lima*. The seat of the ligament is impressed, and forms a small pit immediately below the point of the beak.

The genus *Pectunculus* has been found in England as low in the series as the Great Oolite and as high as the Crag. Mr Sowerby describes five in the London Clay. In the Tertiary Tables of M. Deshayes, we find twenty-seven species almost equally distributed over the three periods—there being thirteen species in the Pliocene, eighteen in the Miocene, and nineteen in the Eocene. In the Green Sand of New Jersey, Dr Morton has obtained casts of this genus. In the Tertiary of Maryland Mr Say has observed one species. Mr Conrad has described three species from the Tertiary of Claiborne and observed one other, the *pulvinatus* of Lamarck, near York Town, Virginia.

GENUS NUCULA. *Lamarck.*

N. Sedgewickii. Plate 3. Fig. 58.

Description. Shell ovately elliptical, oblique, subangular behind, inflated, very inequilateral, smooth ; swollen over

the umbones ; substance of the shell thick ; lunule none ; beaks elevated, recurved ; anterior series of teeth short—posterior series long ; fosset small and oblique ; cavity of the shell rather deep ; margin very minutely crenulate ; nacre very pearly.

Diam. .4,

Length .6,

Breadth .8, of an inch.

Observations. Resembles *Gobboldia* and *lævigata* (Sowerby). It differs from the first in being smooth—from the last in not being truncate, and from both in having a crenulated margin. It has perhaps a stronger resemblance to the *marginata* of Lamarck, a recent European species, and the only recent one known to be crenulate. That distinguished naturalist says it is found fossil in various parts of France. It appears to me that our shell differs in being more robust, more transverse, and having less pointed teeth.

In fine specimens of the *Sedgewickii*, with the aid of the microscope, minute diverging lines may be observed.

In attaching the name of a distinguished geologist to this species, I must make my acknowledgements for the instruction and pleasure derived from his eminently useful labours.

N. ovula. Plate 3. Fig. 59.

Description. Shell ovate, oblique, inflated, very inequilateral, transversely striate, longitudinally and very minutely ribbed ; substance of the shell thin ; lunule large, not deeply impressed ; beaks pointed, recurved ; anterior series of teeth short—posterior series long ; fosset nearly

direct; cavity of the shell deep; margin very minutely crenulate; nacre pearly.

Diam. .3, Length .4, Breadth .5, of an inch.

Observations. This pretty little species in general appearance resembles the *Sedgewickii*, but differs in being more ovate and in having a lunule. Of the species described by Mr Sowerby, it approaches most closely to the *variabilis*, but differs in not being smooth outside, and in having a crenulated margin.

N. pectuncularis. Plate 3. Fig. 60.

Description. Shell trapezoidal, compressed, nearly equilateral, angular before, rounded behind, flattened on the sides, straight at basal margin, longitudinally and minutely ribbed; anterior slope large, carinate; substance of the shell thin; beaks recurved, pointed; both series of teeth small and nearly equal, the posterior one rather the smaller; fosset on the plate and immediately under the beak, oblique; cavity of the shell shallow; margin entire; nacre apparently not pearly.

Diam. Length .1, Breadth 3-20ths, of an inch.

Observations. A single valve only of this truly interesting little *nucula* has been obtained by me. It differs in outline from any species I am acquainted with, its trapezoidal form being very peculiar. At first sight, on examination of the teeth, I took it to be a *Pectunculus*, but a further examination with the microscope showed me the fosset for the ligament, between the two series of

teeth. It has a distinct fosset, but unlike the genus generally in this, it is placed above the teeth, and directly at the point of the beak. We may, with great propriety, consider this to be the connecting link with the *Pectunculi*, the "nuance" being into that of the *P. ellipsis* (nobis). A more complete junction could scarcely be established.

N. Brogniarti.* Plate 3. Fig. 61.

Description. Shell elliptically transverse, somewhat inflated, rounded before, produced and truncate behind, nearly equilateral, furnished with sinuous transverse folds over the disk, and six granose ribs behind, which passing from the beaks to the posterior margin form two channels on each valve; substance of the shell thick; lunule lanceolate; escutcheon inflected, lanceolate; beaks small, pointed, concentrically folded; anterior series of teeth arched—posterior series inflected; teeth pointed, angular, diminishing in size towards the beak; fosset deep, triangular; cicatrices impressed; excavation of the pallear impression small and rounded; cavity of the shell rather shallow, furnished posteriorly with two channels on each valve; margin very minutely crenulate; nacre not pearly.

Diam. .3,

Length .4,

Breadth .8, of an inch.

Observations. Among all the *nuculæ* I have not seen so beautiful a species as this; its fine form and adorned exterior are very remarkable. The folds are larger before the

* Named after the distinguished geologist Al. Brogniart.

umbonial slope. As they approach the anterior margin they become obsolete, but again increase, and are deflected after passing an oblique impressed line, passing from the beaks to the anterior basal margin. Posterior to the umbonial slope the folds are also there deflected, and become smaller. In the furrows very minute transverse striæ may be observed. The lunule, escutcheon and furrows between the ribs are slightly striate. The crenulation of the margin is very minute, and can only be observed on very perfect specimens.

N. media. Plate 3. Fig. 62.

Description. Shell elliptically transverse, somewhat inflated; rounded before, produced and truncate behind, equilateral, furnished with fine concentric folds in the middle, and three ribs on each valve behind; anterior part smooth; substance of the shell thin; lunule none; beaks very small, pointed; anterior series of teeth arched—posterior series inflected; teeth small, pointed, angular, diminishing in size towards the beak; fosset scarcely perceptible; cicatrices obsolete; cavity of the shell rather shallow, having its channel interrupted by a callus; margin entire; nacre not pearly.

Diam. .1, Length 3-20ths, Breadth 7-20ths, of an inch.

Observations. This beautiful little species in outline is like the last described, but differs much in many of its characters. The folds are minute and very remarkably regular. Becoming obsolete as they approach the anterior margin, they there vanish altogether as if erased by attrition.

These folds terminate posteriorly very abruptly at the first rib, of which there are three on each valve, passing from the beak to the posterior margin. The centre rib is the largest, and disposed to be imbricate. A remarkable callus is placed directly in the channel of the posterior part of the cavity of the shell. It is disposed to be polished inside and out.

N. pulcherrima. Plate 3. Fig. 63.

Description. Shell an obtuse angled triangle, very transverse, compressed, nearly equilateral, concentrically folded; folds rather sharp, on the umbonial slope inflected; substance of the shell thin; beaks angular; lunule lanceolate; escutcheon linear; anterior and posterior series of teeth both incurved; teeth arched, diminishing in size towards the beak; fosset small, subtriangular; cicatrices imperceptible; cavity of the shell very shallow, showing the exterior folds and carina of the umbonial slope; margin entire; nacre not pearly.

Diam.

Length .1,

Breadth .2, of an inch.

Observations. A single valve only, the right one of this interesting little species, has come into my possession. The deep folds which cover the whole valve, and its angular form highly distinguish it from any described species with which I am acquainted.

N. plicata. Plate 3. Fig. 64.

Description. Shell elliptically transverse, rather compressed, inequilateral, concentrically and minutely folded, rounded before, produced and truncate behind, furnished on the posterior slope with six ribs—on the anterior part with two curved furrows; substance of the shell thin; lunule lanceolate; escutcheon long, lanceolate; anterior series of teeth arched, posterior series incurved; teeth angular, diminishing in size towards the beak; fosset small, angular; cicatrices imperceptible; cavity of the shell very shallow, having its channel interrupted by a callus; margin entire; nacre not pearly.

Diam. .1, Length .2, Breadth .5, of an inch.

Observations. This species resembles in outline the *Brogniarti* and *media*. It differs from the first essentially in the closeness and regularity of the folds, and from the last in having the folds to continue over its anterior portion. It differs from both in the position of its beaks, which are placed so much towards the anterior part as to render the shell very inequilateral. The ribs too are more sharp. The furrow on the anterior part of the valve of this species is not found in either of the above described species.

This fine genus seems to pervade nearly all the important formations, from the Carboniferous Limestone to the newest of the Supercretaceous Group. The *N. Palmæ**

* Sowerby's Min. Conch. vol. 5.

exists in Derbyshire in the first mentioned formation, and twenty-seven others in the superior beds of England. Five of these are from the London Clay. M. Deshayes gives us twenty-three from the Tertiary of Europe. Six of these are from the Paris basin. Mr Say describes two species, the *lavis* and *concentrica* from the Tertiary of Maryland, and Mr Conrad two from the Tertiary of Claiborne.

ORDER CONCHIFERA UNIMUSCULOSA.

FAMILY MALLACEA.

GENUS AVICULA. *Lamarck.*

A. Claibornensis. Plate 3. Fig. 65.

Description. Shell thin, thickened along the dorsal margin, acutely angular before; beaks small, pointed; teeth small and placed near the anterior margin; wings very oblique; nacre very pearly.

Diam.

Length

Breadth

Observations. Several fragments and one nearly complete valve only were received by me. From these, I am unable to identify it with any other species. It differs from the *A. media* (Sowerby), in being more oblique and

having a smaller hinge. One of the fractured pieces seems to have a wider hinge, and may prove to be of a different species.

About seventeen species have been found fossil in Great Britain. The lowest stratum being that of the Magnesian Limestone (Zechstein)—the highest that of the London Clay, where the *media* only has been observed. Mr Mantell mentions a species (not determined) in the Chalk of Sussex. M. Deshayes gives us five species only, for the two genera *Avicula* and *Meleagrina*, four of which he cites from the London Clay. Why he should not notice the numerous species of Sowerby and Phillips I cannot imagine. I am not aware of any species having been heretofore observed in our formation. Dr Morton mentions his having observed casts in the Green Sand of New Jersey.

FAMILY PECTINIDA.

GENUS PECTEN. *Lamarck.*

*P. Deshaysii.** Plate 3. Fig. 66.

Description. Shell orbicular, rather compressed; ears nearly equal; substance of the shell rather thick; ribs

* Named after the distinguished fossil conchologist M. Deshayes.

about twenty-one, large, alternating with as many small ones, all imbricate ; beaks pointed.

Diam. Length 1.3, Breadth 1.3, of an inch.

Observations. I know no species which this resembles so much as the *gracilis* (Sowerby), from the Crag at Holywells. It differs in having rather large ribs instead of "many small longitudinal ridges."

*P. Lyelli.** Plate 3. Fig. 67.

Description. Shell longitudinal, rounded below, angular above, compressed ; ears very unequal, having a channel on the larger one ; substance of the shell thin ; ribs about twenty-two, rounded, slightly imbricate ; beaks acutely angular.

Diam. Length .8, Breadth .7, of an inch.

Observations. This species differs from the last described in being more elongated, in having very unequal wings, in having a channel on one wing, and in having no alternate ribs. A single small valve accompanied this species, which appears to be different, the ears being not quite so unequal ; further specimens may prove it to be worthy of a specific distinction. If so, I propose the name of *minutus*.

* Named after the eminently distinguished geologist Charles Lyell.

Forty-nine species of this genus have been observed in the strata of Great Britain, from the Carboniferous Limestone to the Crag—three only in the London Clay. Many are described from the Continent, by Nilsson, Hæninghaus, &c. as existing in the Cretaceous Group. M.M. Brogniart and Defrance have described some from the environs of Paris, where they have been found in the Supercretaceous rocks. M. Deshayes gives us sixty for the Tertiary. Twenty-six are from the Pliocene of Sicily and the Subappennines, and ten from the Paris basin. In the Green Sand of New Jersey and Delaware, Dr Morton has observed two or three species. Mr Say, from the Tertiary of Maryland, has described four.

GENUS PLICATULA. *Lamarck.*

*P. Mantilli.** Plate 3. Fig. 68.

Description. Shell oblongo-trigonal, irregular, compressed, ribbed, transversely imbricate, furnished with external and internal ribs, the latter most numerous; substance of the shell thick; teeth striate; cicatrix round.

Diam. .3, Length .7, Breadth .8, of an inch.

Observations. This species, as sometimes among the recent ones, is so irregular in outline as to present almost all the forms between the circle and triangle. It is disposed to be angular above and round below. The small

* Named after the author of the "Geology of Sussex."

internal ribs radiate from the beak, and are more numerous, and independent of the external ones, which vary in number from six to twelve. These internal ribs are disposed to terminate, in the left valve with a tubercle—in the right with a corresponding depression. In young individuals the valves are thin. In all my specimens, the cicatrix differs in colour from the rest of the disk, being whitish.

Three species only of *Plicatula* have been observed in Great Britain, the highest of these in the Chalk Marl (Crai Tufau), being of the Cretaceous Group. Lamarck describes six. In M. Deshayes's Tertiary Tables we find seven, three being from the Paris basin. Mr Say has from the Tertiary of Maryland described one species, *marginata*.

FAMILY OSTRACEA.

GENUS OSTREA. *Linneus.*

O. semilunata. Plate 3. Fig. 69.

Description. Shell semi-lunate, anterior margin much incurved; superior valve incurved—inferior one very convex; beaks produced, rounded and flattened; basal margin rounded.

Diam. .8,

Length 2.3,

Breadth 1.6, of an inch.

Observations. A single specimen (both valves) only has come into my possession. Being somewhat worn, it is difficult to say if the species be squamose or smooth. The superior valve seems to be concentrically striate. On the posterior edge of the upper valve there are a few wrinkles.

O. divaricata. Plate 3. Fig. 70.

Description. Shell semi-lunate, somewhat convex, sub-angular at dorsal margin and recurved, rounded at basal margin, furnished with divaricate ribs over the whole surface; margin crenulate, raised before the beak.

Diam. Length 1.5, Breadth .8, of an inch.

Observations. Like the last, it is difficult to make out the characters from a single specimen. It has some resemblance to the *O. costata* (Sowerby), but is a larger shell and not orbicular.

O. Alabamiensis. Plate 3. Fig. 71.

Two Views.

Description. Shell subelliptical, curved behind, crenulate on both sides of the beak; beaks recurved, pointed.

Diam. Length 2.1, Breadth 1.5, of an inch.

Observations. A single valve only of this species has been received by me. The exterior of this is roughly squamose.

O. lingua canis. Plate 3. Fig. 72.

Two Views.

Description. Shell elliptical, elevated and somewhat truncate at the dorsal and basal margins, convex, crenulate on both sides of the beaks; margin raised between the beak and the base.

Diam. Length 1.8, Breadth 1.1, of an inch.

Observations. A single valve only of this curious species has come into my possession, and it is difficult to make out all its characters with certainty from it. The other valve may present important ones. The form of this valve, owing to the raised margin, resembles a dog's tongue. On the exterior, along the edge of this elevated part, there is a slight fold, apparently as if it had been pushed up in a soft state. Very small radiating striæ may be perceived near the beaks, and the whole surface is irregularly varicose.

O. pincerna. Plate 3. Fig. 73.

Two Views.

Description. Shell orbicular, convex, flattened at the beaks, irregularly wrinkled; substance of the shell thin, diaphanous; beaks bent downwards; margin sharp.

Diam. Length .6, Breadth .6, of an inch.

Observations. Although I have two valves and several pieces of this curious little shell, it is difficult to make out

its permanent characters. It is disposed to be cup-like, thin, diaphanous and wrinkled, but this is not always the case. In the two whole valves the beaks bend down immediately from the margin and make no channel.

The genus *Ostrea* is widely distributed through the fossiliferous strata. In Great Britain thirty-six species have been observed from the Lias to the Crag. Lamarck has described thirty-eight species from various beds and localities. Professor Sedgewick mentions one (species not determined) in the Zechstein of Northumberland. We have in M. Deshayes's Tertiary Tables seventy-two species, forty-two of which are from the Paris basin (Eocene period).

In the Green Sand of New Jersey and Delaware, Dr Morton has observed four or five species. From the Tertiary of Maryland Mr Say has described the *compressirostra*, and Mr Conrad has there observed the *virginica* (Lamarck). Mr Conrad has described three species from South Carolina and Alabama, and has noticed the *virginica* at Suffolk, Virginia.

CLASS MOLLUSCA.**ORDER GASTEROPODA.****FAMILY CALYPTRACIANA.****GENUS FISSURELLA. *Lamarck.******F. Claibornensis.* Plate 3. Fig. 74.**

Description. Shell elliptical, on the back convexly conical, thin ; ribs numerous, cut by striæ, at the sections enlarged ; fissure rather large, oblong, inclined ; margin minutely crenulate.

Long. diam. .4, Transv. diam. .3, Height .2, of an inch.

Observations. One specimen and a fragment are all I have seen from this locality. It has some resemblance to *F. græca* (Lamarck), but is more elevated, has smaller ribs, and is not ovate, but elliptical. It differs, too, in the crenulation of the margin, those of the *græca* being in pairs.

Two species only of this genus seem to have been observed in England, neither of which belongs to the London Clay. The *clathrata* has been found in the Great Oolite—the *græca* in the Crag. In the Tertiary Tables of M. Deshayes we have eight species, four of which are from the Paris basin. From the Maryland deposit we have two species, *F. redimicula* (Say), and *F. græca* (Lamarck), specimens of both of which may be seen in the Academy of Natural Sciences. Of the *græca* being the analogue of the West India species I have great doubt.

GENUS HIPPONIX. *Defrance and Blainville.*

H. pygmæa. Plate 3. Fig. 75.

Description. Shell subrotund, obliquely conical, closely ribbed; apex straight, pointed; cicatrices impressed; margin entire.

Long. diam. .2, Transv. diam. 3-20ths, Height nearly .1, of an inch.

Figure magnified.

Observations. This interesting little shell has a strong resemblance in form to *H. cornucopia* (Defrance and Blainville), *Pileopsis cornucopia* (Lamarck). I have determined to place it in that genus in consequence of its possessing the horse shoe shaped cicatrix mentioned by Blainville,* although I have not seen it attached to any support.

* Manuel de Malacologie, &c. p. 507.

Sowerby mentions two species of the genus *Pileopsis*, from which this is separated, as being found in the Mountain Limestone; and Mantell one species from the Lower Green Sand of Sussex. These are, I believe, all which have been observed in Great Britain. M. DeFrance mentions five fossile species of the genus *Hipponix*. M. Deshayes gives us twelve species of *Hipponix* in his Tertiary Tables—of these, eight are from Paris, nearly the whole being found in the Eocene period. It has not, I believe, been before noticed in this country. This genus was founded by M. DeFrance from the examination of the animal brought by M.M. Quoy and Gamard, which proved to differ from that of the *Pileopsis* (Lamarck).* Schumacher, in 1817, separated the group from the Linnean *Patella*, and made *P. ungarica* the type of a new genus under the name *Amalthea*.

GENUS INFUNDIBULUM. *Montfort.*

I. trochiformis Plate 3. Fig. 76.

Description. Shell orbicular, obtusely conical, slightly tuberculated; substance of the shell thin; whorls all obscure except the first.

Diam. .3,

Height 3-20ths, of an inch.

Observations. Branders's figures of *Trochus apertus* (*In. tuberculatum*, Sowerby), and *T. opercularis*,† resemble this

* Manuel de Malacologie, &c. p. 507.

† Hampshire Fossils, plate 1. fig. 1, 2, 3.

species. It appears, however, to be a thinner shell than either, and to be less tuberculated. These tubercles are disposed to be spinous and open at the top; and in some specimens are obsolete.

Of this genus, six species have been observed in the Tertiary strata of England. One in the Plastic Clay, three in the London Clay, and two in the Crag. M. Deshayes does not recognise the genus. In this country, it has not, I believe, before been observed in a fossil state.

GENUS CREPIDULA. *Lamarck.*

C. cornu-arietes. Plate 3. Fig. 77.

Description. Shell elliptical, very convex, longitudinally curved; substance of the shell rather thick; diaphragm rather large and somewhat thick; beak elevated, produced, curved outwards and backwards; margin oblique, the elevated side being on that of the beak.

Long. diam. 1.5, Transv. diam. .7, Height .6, of an inch.

C. lirata? Conrad.

Observations. This fine species differs much from any recent or fossil one with which I am acquainted. Its oblique margin, and its elevated, produced beak resembling the prow of a Roman galley, eminently distinguish it. It differs from *C. costata* (Morton), in being more elliptical, convex and produced in the beaks.

I am not aware of this genus having been found in a fossil state in Great Britain. M. Deshayes gives us three for the Tertiary on the continent. Dr Morton has observed one, *C. costata*, in the Tertiary of St Mary's, Maryland, and Mr Conrad obtained two in the Upper Marine Formation of Maryland, viz. the *convexa* and *glauca*, both of which Mr Say obtained in a living state on our coast. Mr Conrad has also described a species, the *lirata*, from Claiborne.

FAMILY BULLÆANA.

GENUS BULLA. *Linnaeus.*

*B. St Hillairii.** Plate 4. Fig. 78.

Description. Shell cylindrical, transversely striate; substance of the shell rather thick; spire truncate and umbilicate; whorls somewhat compressed in the middle; columella thickened at the base; mouth linear, wider at the base; outer lip sharp.

Length .7,

Breadth 5-20ths, of an inch.

Observations. This species resembles the figure of Sowerby's *constricta*.† Ours is wider at the base, and the base

* Named after the enlightened traveller and naturalist Geoffrey St Hillaire.

† Min. Conch. plate 464, fig. 2.

of the columella, where it is disposed to put on an obscure fold, is thicker.

Eight species have been observed in England. One in the Coral Rag, five in the London Clay, and two in the Crag. M. Deshayes gives twenty-three in his Tertiary Tables—fourteen are from the Paris basin.

In the Green Sand Formation of Jersey, Dr Morton thinks he has observed casts of the *Bulla*. In the Tertiary of Maryland, Mr Conrad has obtained one species, *Bulla acuminata* (Sowerby).

FAMILY MELANIANA.

GENUS PASITHEA. (*nobis*.)

Description. Shell turrated, sometimes umbilicate; mouth entire, angular above, somewhat effuse at base; columella smooth, thickened.

Observations. The mouth of the shells in the genus proposed above has a strong resemblance to the genus *Melania*.* It is, however, less effuse at the base, straighter and

* The distinguished geologist, M. Brogniart, in his "Terrains du Vicentin," page 58, describes three species of *Melania*, two of which might with propriety be placed in the genus *Pasithea*. He makes the following

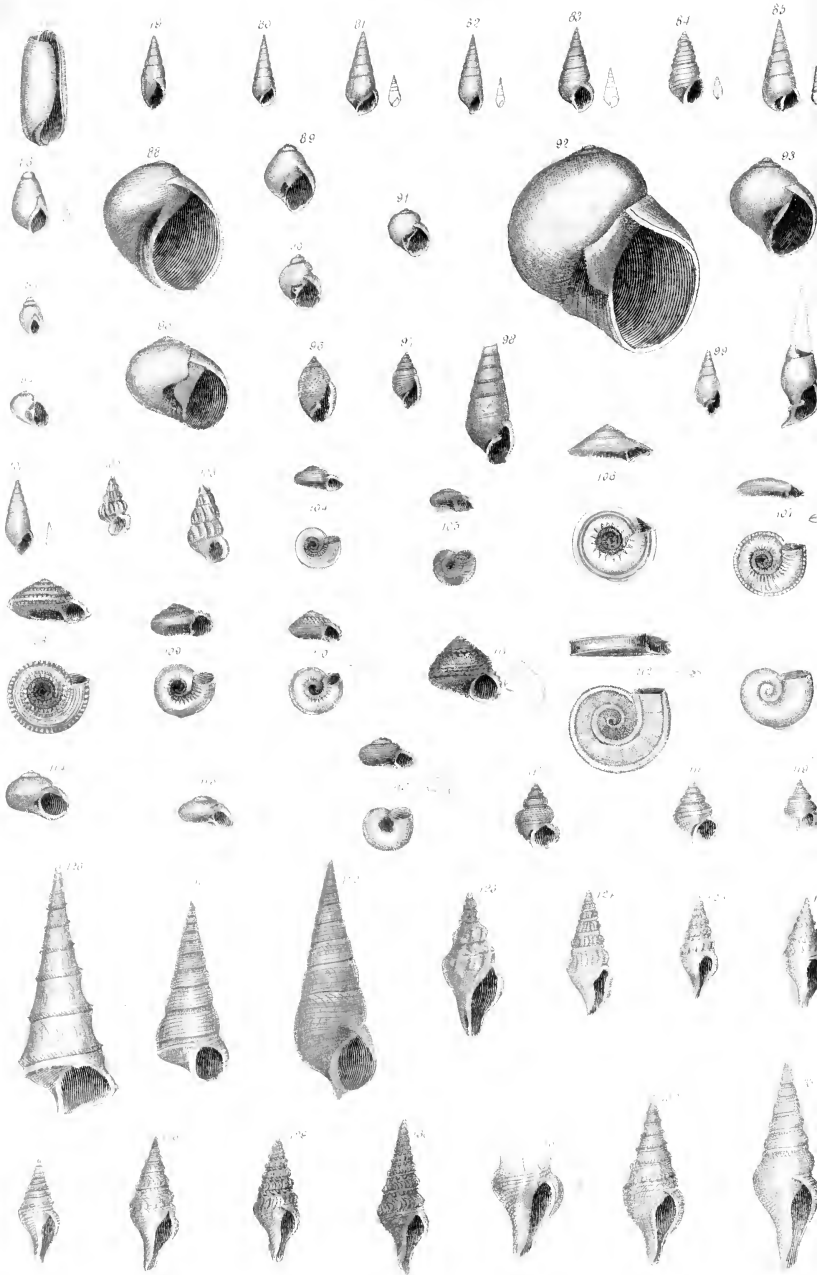
more angular above. Were it not a marine shell, there might be some doubt of the propriety of a separation. This group might be placed in the genus *Rissoa*, if it were not that the mouth is acutely angular above, and is not thickened into a varix, as that genus is. Captain Brown, in his "Illustrations of the Conchology of Great Britain and Ireland," establishes a genus (*Pyramis*), which this perhaps more closely resembles, but judging by the figures (there are no descriptions) I believe there is a generic difference.*

P. secale. Plate 4. Fig. 79.

Description. Shell subulate, smooth; substance of the shell thin; apex acute; suture linear; whorls eight, flattened; mouth acutely angular above—rounded below, one

introductory remarks. "On sait que ce genre artificiel renferme un grand nombre d'espèces hétérogènes, différentes par la forme générale, par les habitudes, et même par le caractère artificiel, tiré de la forme de l'ouverture. C'est donc pour me conformer à ce que à été fait," &c.

* Some time after the observation and note were made upon this genus, I observed in M. Payraudeau's excellent work on the recent shells of Corsica, the description and figure of the *Melania Cambessedesii*, No. 234, which naturally belongs to the genus *Pasithea*. He says, "j'aurais pu créer un genre nouveau pour cette espèce qui n'est point, comme les vraies *Mélanies*, une coquille fluviatile, mais marine." After some further observations, he proposes to make a division of the genus *Melania* for these marine species. I believe it is now universally conceded, that there would be an impropriety in placing in the same genus those animals whose habits lead them to breathe salt water with those which breathe fresh water or air alone. When the animal is so organized as to be capable indifferently of breathing both, as in the migratory fishes, it is a very different matter.



78 BULLA	<i>B. billardi</i>	92 NATICA	<i>alborea</i>	106 SOLARIUM	<i>luteocostata</i>	120 TURRITELLA	<i>caerulescens</i>
79 PASITRENA	<i>ovata</i>	93	<i>crinitata</i>	107	<i>henrici</i>	121	<i>virgata</i>
80	<i>notata</i>	94	<i>maculosa</i>	108	<i>ovoidata</i>	122	<i>apertum</i>
81	<i>lucubra</i>	95	<i>minima</i>	109	<i>lucubrata</i>	123	<i>costata</i>
82	<i>reticulata</i>	96 ACTEON	<i>pinus</i>	110	<i>cancelatum</i>	124	<i>lanceolatum</i>
83	<i>strobilata</i>	97	<i>lineatus</i>	111	<i>argenteolum</i>	125	<i>rotundum</i>
84	<i>reticulata</i>	98	<i>flexuosus</i>	112	<i>rotundum</i>	126	<i>reticulatum</i>
85	<i>quadrata</i>	99	<i>melanostoma</i>	113	<i>planumbra</i>	127	<i>hemisphaerica</i>
86	<i>clausenensis</i>	100	<i>peruvianus</i>	114 TURBO	<i>lucubratus</i>	128	<i>hemisphaerica</i>
87		101	<i>plumbeus</i>	115	<i>lucubratus</i>	129	<i>rugosa</i>
88 NATICA	<i>reticulata</i>	102 SCALARIA	<i>carinata</i>	116	<i>strobilata</i>	130	<i>obliqua</i>
89	<i>parva</i>	103	<i>plana</i>	117 TURRA	<i>alborea</i>	131	<i>clausenensis</i>
90	<i>minor</i>	104 DELPHINULA	<i>depressa</i>	118	<i>subcostata</i>	132	<i>lanceolata</i>
91	<i>minima</i>	105				133	

third the length of the shell ; columella smooth, somewhat thickened at base ; outer lip edged.

Length 7-20ths,

Breadth 3-20ths, of an inch.

Observations. In this species, which is the largest of those I have noticed, the inner lip is less thickened than those which follow.

P. notata. Plate 4. Fig. 80.

Description. Shell subulate, highly polished ; substance of the shell rather thick ; apex acute ; suture very small ; whorls eleven, very flat, each one being marked with an impressed oblique line of growth ; mouth small, acutely angular above, about one fifth the length of the shell ; columella somewhat thickened at the base ; outer lip somewhat arched, with an obtuse edge.

Length 7-20ths,

Breadth .1, of an inch.

Observations. This pretty little species is more attenuate than the preceding, and is remarkable for the slightly oblique lines of growth in each whorl, and which recede spirally from the mouth to the apex.

P. lugubris. Plate 4. Fig. 81.

Description. Shell rather subulate, polished ; substance of the shell rather thin ; apex rounded ; suture linear ; whorls seven, flattened ; mouth subovate, about one fifth the length of the shell ; columella slightly recurved at base ; margin thickened all round.

Length 3-20ths,

Breadth 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. This minute species resembles *P. notata* above described, but has not the marks of growth. It is a smaller species, and the whorls are not quite so flat.

P. aciculata. Plate 4. Fig. 82.

Description. Shell acicular, highly polished; substance of the shell thin; apex very acute; suture linear, very minute; whorls nine, flattened; mouth elongate, acutely angular above—obtusely angular below, about one fourth the length of the shell; columella slightly thickened; outer lip edged.

Length 3-20ths,

Breadth 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. This is the most attenuate of the genus, so far as my observations have extended, and is an interesting minute species, remarkable for its high polish and delicate form.

P. striata. Plate 4. Fig. 83.

Description. Shell conical, transversely striate; substance of the shell thin; apex rather acute; suture impressed; whorls eight, rounded; mouth subovate, about one fourth the length of the shell; columella flattened at the base.

Length 4-20ths,

Breadth nearly .1, of an inch.

The smaller figure is of the size of nature.

Observations. This species differs from those which precede it, in having transverse striae. The whorls are inflated, while the others are flat.

P. sulcata. Plate 4. Fig. 84.

Description. Shell conical, largely and transversely sulcate above; substance of the shell thin; apex obtuse; suture furrowed; whorls five, flattened; mouth subelliptical, one third the length of the shell; columella flattened at the base; margin thickened above.

Length .1,

Breadth 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. A very minute species, remarkable for its large furrows, which become obsolete on the lower part of the whorls. It differs from *striata* in being less elevated, as well as in having furrows.

P. umbilicata. Plate 4. Fig. 85.

Description. Shell elevated above, rounded below, subcarinate, polished; substance of the shell thin; apex acute; suture linear; umbilicus large; whorls nine, flattened; mouth subovate, acutely angular above, one fifth the length of the shell; columella incurved at base; margin entire.

Length .2,

Breadth .1, of an inch.

The smaller figure is of the size of nature.

Observations. This smooth and polished species differs from the above in being umbilicate. Its umbilicus is wide,

with a large spiral groove. On some of the whorls the line of growth may be indistinctly seen.

P. guttula. Plate 4. Fig. 86.

Description. Shell subovate, truncate at top, smooth; substance of the shell rather thin; apex truncate; suture linear; whorls four, flattened above; mouth subovate, acutely angular above, about two fifths the length of the shell; columella slightly incurved at base; margin thickened on the superior part, closing up a small portion of the mouth.

Length nearly .1,

Breadth 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. A single perfect specimen only of this curious little species has been observed by me. It is closely allied to the *Claibornensis*, but differs in the mouth, in the flatness of the whorls and the truncation of the apex.

P. Claibornensis. Plate 4. Fig. 87.

Description. Shell subovate, smooth; substance of the shell very thick; apex obtuse; suture impressed; whorls four, rounded; mouth small, subangular above, one third the length of the shell; columella thickened; margin very much thickened on the superior part, closing up a large portion of the mouth.

Length .2,

Breadth .1, of an inch.

Observations. A single specimen, the mouth of which

is not perfect, is the only one which I have seen. It has a short spire, but is most remarkable for its small and almost round mouth, above which the margin is so much thickened as to fill up a large portion of the arch. It is more nearly allied to the *guttula*, than any other of the genus.

FAMILY NERITACEA.

GENUS NATICA. *Drapernaud.*

N. striata. Plate 4. Fig. 88.

Description. Shell obliquely elliptical, transversely and closely striate; substance of the shell rather thick; spire rather pointed; columella smooth and thickened; outer lip sharp; umbilicus small; whorls four, depressed above, rounded below; mouth spread out, ovate, being two thirds the length of the shell.

Length .7,

Breadth .5, of an inch.

Sigaretus bilix? Conrad.

Observations. This interesting species approaches in form the genera *Stomatella* and *Sigaretus**, but is not sufficiently depressed, to be placed with either of them. It is disposed to be, like them, obliquely flattened in front. I

* M. de Blainville says it is evident that the *Sigaretus* and *Stomatella* can only be separated by the interior naere of the latter, which is pearly.

have two specimens of a fossil shell from France, so closely resembling our species, that it might be doubted if there be propriety in making ours a new species. It is, however, a larger shell, and has little or no umbilicus. It came to me without a name, and I cannot find a description of it in any of the works to which I have access. It has no doubt been described. It may be *Natica sigarettina*, quoted by M. Deshayes in his Tertiary Tables? I have also a recent species, which I do not know to be described, and which I think came from New Holland, so like to these fossil species, that it would be difficult to discriminate between them, were it not in possession of a much larger umbilicus. In the specimens of *striata* in my cabinet, I observe much difference in the striæ. In some of them, these striæ are alternately larger and smaller; sometimes they run two or three together; in the latter case, the surface might properly be said to be grooved. I do not consider these differences sufficient to create new species unless accompanied by difference of form.

N. parva. Plate 4. Fig. 89.

Description. Shell subfusiform, smooth; substance of the shell thin; spire produced and pointed; columella thickened above; outer lip sharp; umbilicus small; whorls five, flattened above; mouth semi-lunate, rather more than half the length of the shell.

Length .4,

Breadth 5-20ths, of an inch.

Observations. The spire of this species is more produced than any I know. The umbilicus is remarkably

small. The thickest part of the columella being above, there is no reflection over the umbilicus. The suture is very small. It differs from the *gibbosa* (herein described), in having the whorls more flattened above, and in having a small umbilicus. It differs also in the callus.

N. minor. Plate 4. Fig. 90.

Description. Shell sub-elliptical, smooth ; substance of the shell thin ; spire produced and rounded at apex ; sutures impressed ; columella thickened and reflected about the middle of the umbilicus ; umbilicus large ; whorls four, rounded ; mouth semi-lunate, about two thirds the length of the shell.

Length .3,

Breadth .2, of an inch.

Observations. This species somewhat resembles the *gibbosa* but is very much smaller. It is remarkable for its length and for the roundness of its whorls, in which it has some resemblance to the *Paludina*. The callous or thickened part of the columella is placed directly in the middle of the umbilicus, and in this specimen, the only one I have seen, there are two or three angular impressions on the lower part of it. I have not mentioned this character in the specific description, doubting if it exists on all.

N. minima. Plate 4. Fig. 91.

Description. Shell globose, smooth ; substance of the shell thin ; spire flattened ; sutures impressed ; columella

thickened, the callus being reflected at the middle of the umbilicus; umbilicus large, grooved; whorls four, rounded; mouth subovate, about three fourths the length of the shell.

Length 5-20ths,

Breadth .2, of an inch.

Observations. In the roundness of the whorls it resembles the *minor* described above, but differs in being globose, while that shell is more elliptical. It has also a much smaller callus.

N. gibbosa. Plate 4. Fig. 92.

Description. Shell subovate, gibbous, smooth; spire rather produced; substance of the shell thick; callus thick; umbilicus large; whorls five; mouth sub-elliptical.

Length 1.1,

Breadth .9, of an inch.

Observations. I have received but a single specimen of this species. It is rather more elongated than usual in the *Naticæ*. The upper part of the whorls being flattened and the lower part being inflated, gives the shell a gibbous appearance.

N. semilunata. Plate 4. Fig. 93.

Description. Shell subglobose, smooth; substance of the shell rather thin; spire slightly elevated; suture rather impressed; columella but slightly thickened, the callus being reflected at the middle of the umbilicus; umbilicus large and grooved; whorls five, inflated, slightly flattened

below the suture ; mouth semi-lunate, about two thirds the length of the shell.

Length .4,

Breadth 7-20ths, of an inch.

The figure is somewhat larger than nature.

Observations. This species resembles the *minor* above described, but differs from it in being more globose, the spire being much more depressed. The depression of the superior part of the whorl also distinguishes it.

N. magno-umbilicata. Plate 4. Fig. 94.

Description. Shell subglobose, smooth ; substance of the shell thin ; spire depressed, rounded ; suture small ; columella very slightly thickened, the callus being small and reflected above the middle of the umbilicus ; umbilicus very wide, grooved ; whorls three, inflated, with longitudinal folds on the superior part ; mouth semi-lunate, nearly three fourths the length of the shell.

Length .2,

Breadth nearly .2, of an inch.

Observations. A single specimen only of this species has come under my examination. It most resembles the *minima* (above described), but has a larger umbilicus. It differs from all the species herein described, in having folds radiating below the sutures.

N. mamma. Plate 4. Fig. 95.

Description. Shell subglobose, flattened below, smooth ; substance of the shell thin ; spire rounded at the apex,

pointed; suture very small; columella much thickened above; outer lip sharp; callus folding into the superior part of the umbilicus; umbilicus large; whorls four, rather depressed above and rounded below; mouth ovate, being about three fifths the length of the shell.

Length .5,

Breadth .5, of an inch.

Observations. Somewhat allied to *gibbosa*, but differs in the form of the whorls and the length of the spire. The last whorl of the *mamma* is so large that but a small portion of the superior whorls is visible.

The genus *Natica* is widely spread through the various strata from the Inferior Oolite to the Crag in Great Britain, where nearly twenty species have been observed. Twelve of these have been found in and about the London Clay. M. Deshayes mentions forty-one as being found in the Tertiary period, being well distributed through the Pliocene, Miocene and Eocene periods. In this country, Dr Morton has found casts in the Cretaceous Group of New Jersey, and four have been described by Messrs Say and Conrad from the Tertiary of Maryland.

FAMILY PLICACEA.

GENUS ACTEON.* *Montfort.**A. punctatus.* Plate 4. Fig. 96.

Description. Shell ovately conical, transversely and closely furrowed; furrows closely set with punctures; substance of the shell rather thick; spire rather elevated, pointed; suture somewhat impressed; columella with one fold; whorls five; mouth narrow, about three fifths the length of the shell; outer lip thickened about the middle.

Length 7-20ths,

Breadth .2, of an inch.

Observations. This beautiful little species is remarkable for its graceful form and beautifully punctured furrows. It is closely allied to the *lineata* (herein described). It differs in being less conical, and in having larger punctures. Only one specimen of these in my possession has the thickened lip. Of the remainder, one seems young, the other broken. Sowerby's figure of *A. Noæ*, (Min. Conch. plate 374) has a strong resemblance to this species, but does not seem to have the punctured furrows, or thickened out lip.

* Tornatella (Lamarck).

A. lineatus. Plate 4. Fig. 97.

Description. Shell conical, transversely furrowed; furrows closely set with minute punctures; substance of the shell thin; spire elevated, pointed; suture impressed; columella with one fold; whorls six; mouth rather narrow, about half the length of the shell; outer lip crenate.

Length .3,

Breadth 3-20ths, of an inch.

Observations. This very beautiful and interesting little species closely resembles the last described, but is specifically different. It has a still closer resemblance to a species in my cabinet from the Paris basin, which I do not know to be described. It is not, however, quite so elevated as that specimen. It differs, also, in having one band or space, without a furrow, on the superior part of the body whorl, while the other has two such bands. In our species the superior whorls have but three furrows, that from Paris has four. These characters may be found to differ in other individuals. In outline it resembles the *striatus* (Sowerby) (Min. Conch. vol. 5), but differs in many other characters. The *Acteon ovoides* (Conrad), from the Tertiary of Maryland, is very similar to this in general form, but does not appear to have any punctures in the furrows. I have not, however, seen a good specimen of it.

A. elevatus. Plate 4. Fig. 98.

Description. Shell subulate, polished, furnished with a single transverse furrow near the middle of the whorl; substance of the shell rather thick; spire very much elevated; suture furrowed; columella with one large and one small fold; whorls flattened above the medial furrow; mouth oblique, subovate; outer lip simple.

Length

Breadth .2, of an inch.

Observations. This interesting species differs from any with which I am acquainted. The specimens I have been able to examine (three) are all more or less broken. The best one which is here figured is broken at the top, six whorls only remaining. It most probably had about ten. At first view of the mouth, the large fold only would be observed. More internally, and below it, a very minute one may be seen with the aid of the microscope. In one specimen this lower fold appears to be disposed to separate into two—other individuals may show this character more developed.

A. melanellus. Plate 4. Fig. 99.

Description. Shell subulate, smooth; substance of the shell rather thick; spire elevated, pointed; suture sharply impressed; columella with a single large fold; whorls six, flattened; mouth ovate, outer lip simple.

Length 7-20ths.

Breadth 3-20ths, of an inch.

Observations. This small species has some resemblance to the last described, but differs in size, in the number of folds, and in being without a furrow.

A. striatus. Plate 4. Fig. 100.

Description. Shell subulate, polished, minutely and transversely striate; substance of the shell rather thin; suture deep and sharp; columella with a single large fold; whorls ———, flattened.

Length

Breadth .1, of an inch.

The smaller figure is of the size of nature.

Observations. But a fragment of this species has come under my observation, and the figure represents it with its broken mouth and spire. There is enough of the remains to distinguish it from those before described. It most resembles the last, but differs in being striate, and is apparently more attenuate in the spire, which I presume is very acute.

A. pygmaeus. Plate 4. Fig. 101.

Description. Shell subulate, smooth, polished; substance of the shell thin; suture impressed; spire elevated; columella with a single, rather small fold, whorls six, flattened; mouth ovate; outer lip simple.

Length 3-20ths,

Breadth 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. This diminutive species resembles most

the last described, differing, however, in being less elevated and without striæ. It has some resemblance to *A. melanoides* (Conrad), but has no striæ.

The genus *Acteon* has been observed in England, where nine species have been described, as low as the Inferior Oolite; two are from the London Clay, and two from the Crag. M. Deshayes's Tables give eleven from the Tertiary period: being in all the three subdivided periods, Pliocene, Miocene and Eocene. In the Tertiary of Maryland, at St Mary's, Mr Conrad has observed two, *ovoides* and *melanoides*, described by him in vol. 6, Jour. Acad. Nat. Sci.

FAMILY SCALARIANA.

GENUS SCALARIA. *Lamarck.*

S. planulata. Plate 4. Fig. 102.

Description. Shell conical, closely ribbed, minutely and transversely striate between the ribs; substance of the shell thick; spire rather elevated; ribs about twelve, rounded; whorls ———, flattened, the last one only ribbed to the middle; mouth round.

Length .3,

Breadth 3-20ths, of an inch.

Observations. Having only a single specimen of this species, and that mutilated, I am unable to give its charac-

ters with certainty. The mouth and apex are destroyed. The figure represents it in that state. It is flatter on the whorls than usual in this genus. The inferior half of the body whorl is not ribbed but transversely striate. It seems closely allied to *S. semicosta* (Sowerby.)

S. carinata. Plate 4. Fig. 103.

Description. Shell conical, closely ribbed, carinate on the inferior part of the last whorl; substance of the shell thick; spire elevated, pointed; ribs about twelve, lamelliform; whorls six, rounded; mouth round.

Length

Breadth .2, of an inch.

Observations. All the specimens I have of this species are more or less mutilated, the lip is not perfect in any one. It differs from the above in having rounded whorls, in the continuation of the ribs to the base, and in the sharpness of those ribs. In the carina it resembles the *lamellosa* (Lamarck), a recent species from our southern coasts. It is, however, specifically different, being a smaller species and more attenuated.

S. quinquefasciata.

Description. Two fragments of a species, for which I propose this name, are in my cabinet. These display sufficient characters to distinguish it. Five rather depressed bands are placed, transversely, on the middle of the whorls. Between the ribs are transverse striae. The ribs are sixteen in number and lamelliform. It is carinate below, with a

small round mouth which is much thickened and reflected. The ribs have some resemblance to the *multistriata* (Say), a recent species of our southern coasts, but it certainly is not the same species.

In England the *Scalariæ* have not been found below the London Clay. Five have been described from that formation, and six from the Crag. The Tables of M. Deshayes give twenty-two species from the three periods of the Tertiary, which seem there to be nearly equally distributed. In the Cretaceous Group of New Jersey, Dr Morton discovered a fine species (*annulata*). Mr Conrad mentions two as existing in the Tertiary of Maryland.

GENUS DELPHINULA. *Lamarck.*

D. plana. Plate 4. Fig. 104.

Description. Shell subdiscoidal, carinate, beneath flat, obsoletely and transversely striate, above rounded and strongly striate; substance of the shell rather thin; spire flattened; suture widely furrowed; umbilicus wide, carinate, striate; whorls four; mouth oblique, round within, subangular at the outer edge.

Length .1,

Breadth .2, of an inch.

Observations. This little species is remarkable for the flatness of its inferior portion, for its carina, and wide furrowed suture. Between the transverse striæ and in the

furrow, smaller striæ may be perceived. In the umbilicus the striæ on the inferior part of the whorl are longitudinal—on the superior part transverse. The two carinæ cause the lip to be slightly angular.

D. depressa. Plate 4. Fig. 105.

Description. Shell sublenticular, polished, obsoletely and transversely striate, substance of the shell thick; spire depressed; suture slightly impressed; umbilicus rather small, thickened and wrinkled at the edge; whorls three; mouth subelliptical.

Length nearly .1,

Breadth .2, of an inch.

Observations. Of this curious and interesting little species, I have procured but a single specimen. Its smoothness and general form are very unusual in this genus. Its lenticular form causes the mouth to be somewhat oval. A small portion only of the lip is perfect, and it seems to be thickened and somewhat reflected.

De la Beche mentions an undetermined species as existing in Yorkshire, as low down as the Oolitic Group. Sowerby does not describe any, in his "Mineral Conchology." M. Deshayes, in his excellent Tables, gives twelve for the Tertiary. There are eight in the Paris basin, and five in the London basin.

I believe none have been heretofore observed in our deposits.

FAMILY TURBINACEA.

GENUS SOLARIUM. *Lamarck.**S. bilineatum.* Plate 4. Fig. 106.

Description. Shell sublenticular, rather elevated above and flattened below, with a double line near the margin ; substance of the shell rather thin ; suture with a double impressed line ; umbilicus very wide, perspective, largely crenate ; whorls five, sharply carinate ; mouth subtriangular.

Length .2,

Breadth 9-20ths, of an inch.

Observations. A beautiful depressed species, remarkably flat on the inferior side. In a young specimen the inferior side of the carina is somewhat crenate. Within the umbilicus, beyond the crenulated edge, there is a minute transverse line.

S. Henrici. Plate 4. Fig. 107.

Description. Shell lenticular, rather flattened at the apex, with radiating wrinkles above and below, furrowed on both sides of the carina which is slightly crenate ; substance of the shell thin ; suture impressed ; umbilicus very wide, perspective, crenate, deeply furrowed within ; whorls four ; mouth triangular.

Length 1-20th,

Breadth .2, of an inch.

The smaller figure is of the size of nature.

Observations. A single specimen of this pretty little species was found in the sand of the box in which the specimens came, by a young conchologist of my family. I promised him that it should be his species, should it prove new, of which, on examination, I have no doubt. The radiating striæ are closer as well as longer, and more numerous below than above.

S. ornatum. Plate 4. Fig. 108.

Description. Shell convex above, flattened below, furnished with many granular transverse lines, three of which, on the superior part of the whorl, are larger than the others, furrowed on both sides of the carina which is crenulate, longitudinally striate; substance of the shell rather thick; suture furrowed; umbilicus very wide, perspective, beautifully crenate at the edge, furrowed within and longitudinally striate; whorls six; mouth suborbicular.

Length .2,

Breadth 9-20ths, of an inch.

Observations. This species is very like Branders's figure of *Turbo canaliculatum*, and Sowerby's figure of the same species, *Solarium canaliculatum*, plate 524. On comparison, however, with a specimen from Hampshire, sent to me under that name, I find them very different; the umbilicus being much wider in the species from Claiborne, which is also more carinate, and has smaller and more numerous granulate lines.

S. elegans. Plate 4. Fig. 109.

Description. Shell subdiscoidal, polished, transversely striate above, with two or three granular transverse lines; substance of the shell thin; spire flattened; suture furrowed; umbilicus wide, perspective, crenulate; whorls five; mouth round.

Length 3-20ths,

Breadth .3, of an inch.

Observations. One of the specimens is so perfect as to present coloured spots (oblique) on the whorl. It is with much hesitation I place this and the two following species in the genus *Solarium*. Their mouths are round, and somewhat like that of the *Delphinula* and *Turbo*, but the crenulate umbilicus seems to make it necessary to place them in this genus. In the form of the mouth they resemble the *S. variegatum* (Lamarck), which is nearly round. With that species they might form a natural group.

S. cancellatum. Plate 4. Fig. 110.

Description. Shell subconical, crossed by longitudinal and transverse striæ, which are thickened at the intersection; substance of the shell thin; suture furrowed; umbilicus rather wide, crenate without, cancellate within, perspective; whorls four; mouth suborbicular.

Length .1,

Breadth 3-20ths, of an inch.

The smaller figure is of the size of nature.

Observations. This beautiful little species has in its ge-

neral form most resemblance to the *variegatum* of Lamarck. It is, however, a minute shell, and differs in most of its minor characters.

S. granulatum. Plate 4. Fig. 111.

Description. Shell conical, flattened below, with seven or eight transverse granulate lines, between which it is furnished with oblique striæ; substance of the shell thick; suture furrowed; umbilicus narrow, largely crenate without, striate within; whorls five; mouth nearly round, subangular above; outer lip crenate.

Length .2,

Breadth .2, of an inch.

The smaller figure is of the size of nature.

Observations. This truly beautiful little species resembles more nearly a *Turbo* than either of the two last. The roundness of its mouth and the elevation of its spire would seem to forbid its being placed in the genus *Solarium*. Its crenulate umbilicus, its granulations, and its crenulate lip seem to make it necessary to place it here. It certainly resembles *S. variegatum*, but is more conical and has not so wide an umbilicus. I place it last of the genus, and it may be considered the connecting link with the *Turbones*.

Sedgewick and Murchison, on the structure of the Eastern Alps, a most valuable memoir in the Geological Society's Transactions, vol. 3 of 2d series, plate 38, fig. 14, represent a shell under the name of *Turbo arenosus*, which certainly resembles our shell, but it is more elevated.

The genus *Solarium* in England, where seven species have been described, has been observed as low down in the series as the Inferior Oolite. Mr Sowerby describes four from the London Clay. M. Deshayes gives, in his Tables, sixteen species from the Tertiary. Eight of these are from the Eocene of the Paris basin, and six from the Pliocene of the Subappennines. Mr Conrad has described a species from Claiborne, the *elaboratum*.

GENUS ORBIS. (*nobis.*)

Description. Shell orbicular, discoidal, umbilicate; mouth quadrangular; umbilicus large, spiral; all the whorls on both sides visible; columella none.

I have in vain endeavoured to place the shell on which I propose to found the above genus, in some one already established. It appears to me to differ so essentially in having quadrangular whorls, and of course having the mouth of that form, that I could not with propriety place it in the genus *Solarium* which it most resembles. It has some resemblance to the genus *Maclurite* (Lesueur), but differs in the plane of the sides and the mouth.

O. rotella. Plate 4. Fig. 112.

Description. Shell flat above and below, bicarinate; apex rather impressed; substance of the shell very thin; suture linear; umbilicus wide, perspective, carinate on

the edge; whorls four, perfectly square; mouth quadrangular.

Length 1-20th,

Breadth 3-20ths, of an inch.

The smaller figure is of the size of nature.

Observations. This curious and interesting little species is the only perfectly flat shell I am acquainted with. The *Pleurotomarium tuberculosum* of DeFrance, as figured by Blainville, has in its general form some resemblance to it. Its sinus, its rounded mouth and somewhat convex spire, render it impossible to confound even the genera.

GENUS PLANARIA.* *Brown.* (*Maclurite?* *Lesueur.*)

P. nitens. Plate 4. Fig. 113.

Description. Shell discoidal, impressed above and below, smooth and shining, diaphanous; substance of the shell very thin and fragile; whorls three, convex; mouth lunate; outer lip reflected.

Length less than 1-20th,

Breadth less than 1-20th, of an inch.

The smaller figure is of the size of nature.

Observations. This very minute species is so fragile that I have found it impossible to secure a perfect specimen. It resembles closely the *P. alba* (Brown), but that shell has not a reflected margin. I have found a single specimen only with this part perfect enough to show this character

* Established by Capt. Thomas Brown of Edinburgh for some small species found on the coast of Scotland.

of its aperture. Lamarck's description of *Planorbis nitidulus* gives the characters of this shell with the exception of the reflected margin. If our shell were fresh water there certainly would not be any necessity to remove it from the genus *Planorbis*, unless the reflected margin should be considered a character sufficiently distinctive. In the description of the *Planorbis*, Lamarck says "margine nunquam reflexo."

GENUS TURBO. *Linnæus*.

T. naticoides. Plate 4. Fig. 114.

Description. Shell rather convex, smooth; substance of the shell thick; suture linear; umbilicus small; whorls four; mouth very round; outer lip edged.

Length .2,

Breadth 7-20ths, of an inch.

Observations. This little species has somewhat the aspect of a *Natica*. It seems to have no striking characteristic, but I cannot identify it with any described species. One of the specimens is somewhat polished.

T. nitens. Plate 4. Fig. 115.

Description. Shell rather depressed above, flattened below, polished; substance of the shell thick; suture linear; umbilicus rather large and round; whorls four; mouth suborbicular, outer lip edged, thickened at its superior junction with the whorl.

Length 3-20ths,

Breadth 5-20ths, of an inch.

Observations. Smaller than the above, this species has some resemblance to it. It differs in being a flatter shell, in being highly polished, and in having the outer lip thickened where it is in contact with the whorl. Immediately below the umbilicus there is usually a slight impression on the lip.

T. lineata. Plate 4. Fig. 116.

Description. Shell rather depressed above, rounded below, nearly covered with transverse elevated lines, smooth round the umbilicus; substance of the shell thin; suture furrowed; umbilicus rather large, round; whorls four; mouth round; outer lip edged.

Length .1,

Breadth 3-20ths, of an inch.

The smaller figure is of the size of nature.

Observations. This minute species differs from the preceding, in having transverse lines and a wide furrow along the suture. The whorls are also more rounded.

The genus *Turbo* has been observed in Great Britain, as low down as the Mountain Limestone, and through nearly all the superincumbent strata to the Crag. Eighteen species are mentioned by Sowerby, Phillips and Brander, two only being in the London Clay. M. Deshayes's Tables give thirty-four for the Tertiary, sixteen being in the Eocene of the Paris basin alone. In this country there have not been before, that I am aware of, any of the *Turbones* noticed in our formations.

GENUS TUBA. (*nobis.*)

Description. Shell conical, umbilicate ; whorls rounded ; mouth round ; margin not united above ; columella thickened and reflected at the base.

This genus is nearly allied to *Turbo* and to the *Rissoa* of Fremenville ; but not being able, with propriety, to place it with either, I propose to constitute for it a new genus. The reflected margin, which is disposed to be effuse, has at the base some similarity to the *Melania*, and therefore cannot be placed in the genus *Turbo*. It cannot be placed in the genus *Rissoa*, being umbilicated. In eight species of *Rissoa*, in my cabinet, all are thickened round the margin, forming a varix. The *Tuba* has no thickening of this kind, the margin being crenulate. The *Rissoa* has an acute apex, while that of the *Tuba* is almost truncate, the superior whorls being smooth and gibbous. Mr Sowerby's Mineral Conchology, plate 395, figures a shell (*Turbo sculptus*), which, I think, should be placed in this genus. It is from the London Clay of Barton. Of it, and the preceding one, he says, they "do not agree precisely with the character of the genus *Turbo* of Lamarek," and further, "they form a passage towards *Delphinula*."

T. striata. Plate 4. Fig. 117.

Description. Shell elevated above, rounded below, thickly covered with transverse striæ cut by minute longitudinal striæ; substance of the shell rather thick; apex not acute; suture impressed; umbilicus very small; whorls six, inflated; mouth nearly round, striate within, one-third the length of the shell; outer lip crenate.

Length 7-20ths,

Breadth .2, of an inch.

Observations. A beautifully ornamented and certainly very interesting shell. It is closely filled with transverse rounded striæ, having the appearance of cords, the middle one of which is rather the largest. The cutting striæ are somewhat imbricate. Single specimens only of this and the two following species have come into my possession. This species more strongly resembles the *Turbo sculptus* of Sowerby, than the following species do.

T. alternata. Plate 4. Fig. 118.

Description. Shell elevated above, rounded below, with numerous transverse striæ, alternately larger and smaller, cut by fine longitudinal striæ; substance of the shell rather thick; apex not acute; suture sharply impressed; umbilicus small; whorls six, inflated; mouth nearly round, striate within, one third the length of the shell; outer lip crenate.

Length .3,

Breadth .2, of an inch.

Observations. This species is very closely allied to the above, but may at once be distinguished by the transverse striae which alternate in this. The longitudinal striae are not so close, nor are they imbricate.

T. sulcata. Plate 4. Fig. 119.

Description. Shell elevated above, rounded below, with numerous transverse furrows, the two superior ones being indistinct; substance of the shell rather thin; apex not acute; suture impressed; umbilicus —; whorls inflated; mouth —.

Length

Breadth .2, of an inch.

Observations. This fragment resembles so closely the two species above described, that I have with but little hesitation placed it in the same genus. It has apparently lost only one whorl—seven remain. It is rather more alternate than the preceding, and differs entirely in being furrowed, and having no longitudinal striae. Some of the parts being absent, I am necessarily compelled to make an unfinished description and figure.

GENUS TURRITELLA. *Lamarck.*

T. carinata. Plate 4. Fig. 120.

Description. Shell turrited, transversely striate and carinate; apex acute; substance of the shell thick; suture

impressed ; whorls concave, carinate on the inferior part ; mouth suborbicular, effuse.

Length 1.3,

Breadth 9-20ths, of an inch.

Observations. Fragments of this species were obtained quite large, together with some young ones more perfect. Some of the specimens are much more striate and carinate than others. It resembles in the superior part a species sent me by Dr Grateloup from Dax, under the name of *strangulata* (Grateloup). In the mouth it widely differs.

T. lineata. Plate 4. Fig. 121.

Description. Shell turritid, transversely and finely lineate ; substance of the shell thin ; apex acute ; suture furrowed ; whorls convex ; mouth subquadrangular.

Length .9,

Breadth .4, of an inch.

Observations. This finely lined and pretty species seems to be much less abundant than the preceding, with which it cannot easily be confounded, the whorls being convex.

This genus has been observed in Great Britain in nearly all the formations from the Carboniferous Limestone to the Alluvial. Five have been described in the London Clay, and two in the Crag. M. Deshayes's Table of this genus is very extensive, giving forty-five species (Tertiary). Seventeen are from Paris, and nineteen from Italy (Subapennines) being of the Pliocene Period. In the Cretaceous Group of New Jersey and Delaware, Dr Morton has observed

casts. Three species are described by Say and Conrad from the Miocene of Maryland.

FAMILY CANALIFERA.

GENUS CERITHIUM? *Bruguiere*.

C. striatum. Plate 4. Fig. 122.

Description. Shell turritid, transversely and finely striate; substance of the shell rather thin; apex acute; suture not deeply impressed; whorls about thirteen, rather convex; columella reflected; mouth subquadrangular, effuse at base.

Length 1.3,

Breadth .4, of an inch.

Observations. The striæ of this species have a strong similarity to that of the *Turritella lineata* above described, but the sutures are different. In most specimens numerous longitudinal flexed folds may be observed.

I am by no means satisfied in placing this shell among the *Cerithia*. It has a stronger resemblance in the mouth to the genus *Melania*, but being a marine shell cannot with propriety be placed in that genus. Blainville figures a shell (plate 21, bis. fig. 2), under the name of *Potamides fragilis*, which certainly ought to belong to the same genus with this, the mouth being very nearly the same. Until more species shall be obtained, I have forborne to create for it a new genus. More decisive characters may then be observed,

which will designate with certainty the genus. I would further remark, that there have been no *Cerithia* yet found in the beds of this locality, although they abound in England, and on the continent, in the Tertiary, from which formation M. Deshayes gives two hundred and twenty species. In the Paris basin alone there are one hundred and thirty-seven species. That there should not yet have been a single true *Cerithium* observed in the bed at Claiborne is certainly a curious and interesting fact.

GENUS PLEUROTOMA. *Lamarck.*

P. cælata. Plate 4. Fig. 123.

Description. Shell fusiform, turritid, carinate, longitudinally folded, covered transversely with minute striæ; substance of the shell thick; apex acute; whorls eight, subcanaliculate above; mouth narrow, nearly half the length of the shell.

Length .8,

Breadth .3, of an inch.

Observations. This species is remarkable for its fine transverse striæ, which resemble the finest engraving.

*P. Lonsdalii.** Plate 4. Fig. 124.

Description. Shell fusiform, turritid, longitudinally folded, transversely and faintly striate, substance of the

* Named after the intelligent and efficient curator of the Geological Society of London.

shell thin; spire elevated and acute at apex; whorls ten, with an elevated band below the suture; mouth rather narrow, about one third the length of the shell.

Length .5,

Breadth .2, of an inch.

Observations. A pretty little species, and may be distinguished by its elevated spire, and the band which surrounds the whorls below the suture.

P. Sayi.* Plate 4. Fig. 125.

Description. Shell fusiform, turrated, longitudinally and thickly folded, transversely and strongly striate; substance of the shell rather thin; spire elevated, pointed at the apex; whorls eight, subcanaliculate above; mouth rather narrow, about one third the length of the shell.

Length .5,

Breadth .2, of an inch.

Observations. This species very closely resembles the last described, but may be distinguished by its more numerous folds and stronger striæ, which are disposed to be larger and smaller alternately. It has a strong resemblance to the species figured by Sowerby under the name of *P. comma*.†

P. monilifera. Plate 4. Fig. 126.

Description. Shell fusiform, turrated, transversely striate, furnished with a larger and smaller row of tuber-

* Named after the distinguished naturalist Thomas Say.

† Min. Conch. plate 146, fig. 5.

cles; substance of the shell thin; spire elevated, pointed at the apex; whorls nine; mouth two fifths the length of the shell.

Length .6,

Breadth .2, of an inch.

Observations. This species differs from the last described, in having a double row of tubercles, and in the mouth being rather longer. It has a very close resemblance to the *P. semicolon* (Sowerby).*

P. Baumontii.† Plate 4. Fig. 127.

Description. Shell ovately fusiform, transversely striate, furnished with a single row of compressed tubercles near the middle of the whorl; substance of the shell rather thin; apex pointed; whorls eight, subcanaliculate above; mouth nearly one half the length of the shell.

Length .6,

Breadth .2, of an inch.

Observations. A beautiful little species, differing somewhat in its form from those above described, as well as in the tubercles and striae. The tubercles are compressed, and adorn the wider portion of the whorl. The striae are wide apart, and below the line of tubercles these are, for four or five rows, alternately, smaller. In the canal above the tubercles, flexuous folds of the form of the sinus are visibly and closely set.

* Min. Conch. plate 146, fig. 6.

† Named after the distinguished geologist Elie de Baumont.

P. Desnoyersii.* Plate 4. Fig. 128.

Description. Shell fusiform, turrated, closely and transversely striate, slightly tuberculate on the superior whorls; substance of the shell rather thick; spire elevated, pointed at the apex; whorls eight; mouth two fifths the length of the shell.

Length .7,

Breadth 5-20ths, of an inch.

Observations. In outline somewhat like the last described, but differing in the striæ and tubercles. In the *Desnoyersii* the transverse striæ are disposed to alternate, and are cut by almost imperceptible longitudinal striæ.

P. Hæninghausii.† Plate 4. Fig. 129.

Description. Shell fusiform, turrated, transversely striate, furnished with two rows of longitudinal folds in zig-zag; substance of the shell rather thin; spire elevated, acute at apex; whorls ten, subcanaliculate above; mouth rather narrow, about one third the length of the shell.

Length .7,

Breadth .4, of an inch.

Observations. This species may be distinguished by its double row of folds, which being placed, the superior one obliquely to the right, the other to the left, produce a zig-zag appearance.

* Named after M. Desnoyers, advantageously known for his labours in the Tertiary deposits.

† Named after the distinguished geologist of Crefeld.

P. rugosa. Plate 4. Fig. 130.

Description. Shell fusiform, turrated, transversely and widely striate on the inferior part, furnished with one row of folds and one of granulations; substance of the shell rather thin; suture sulcate; spire elevated, acute at apex; whorls twelve; mouth narrow, one third the length of the shell.

Length .8,

Breadth 5-20ths, of an inch.

Observations. The folds and granulations of this species give it a rougher appearance than the others described here. The furrow along the suture is marked, being formed by the two superior transverse large striæ. On the superior part of the whorl, there are in some specimens minute transverse striæ.

P. obliqua. Plate 4. Fig. 131.

Description. Shell transversely and alternately striate below, canaliculate above, furnished with a row of oblique folds on the wider part of the whorl; substance of the shell rather thick; whorl subcanaliculate above; mouth long and narrow.

Length

Breadth .4, of an inch.

Observations. A single whorl only, being the inferior one, has come under my notice. It is perhaps the largest species here described. The description is of course defective, for want of the superior whorls. I have no hesita-

tion, however, from what remains, to consider it distinct ; the folds, the striæ and general form differing from any of the species here described.

P. Childreni.* Plate 4. Fig. 132.

Description. Shell fusiform, turrated, transversely striate, granulate on the larger part of the whorl ; substance of the shell rather thick ; spire elevated, obtuse at apex ; whorls about nine, subcanaliculate above ; mouth long and narrow, one third the length of the shell.

Length .9,

Breadth .3, of an inch.

Observations. This is a beautiful species, distinct by its granulations, the row of which is disposed to be double. About the middle of the whorl the striæ are large. On the superior part there are two or three minute ones.

P. Lesueurii.† Plate 4. Fig. 133.

Description. Shell fusiform, turrated, covered with closely set transverse striæ, which are cut by indistinct longitudinal ones ; substance of the shell rather thick ; spire elevated, acute at apex ; whorls about nine, subcanaliculate above ; mouth long and narrow, about two fifths the length of the shell.

Length 1.1,

Breadth .4, of an inch.

* Named after the secretary of the Royal Society, eminent for his acquirements in science.

† Named after the naturalist M. Lesueur, the companion of Peron.

Observations. This species is more completely covered with striæ than any other here described. On the superior part of the shell very minute folds may in some specimens be observed.

This beautiful genus exists in great numbers in a fossil state in the superior beds, but has not, I believe, either in this country or in Europe, been observed below the Tertiary. Sowerby describes eleven from the London Clay, it being found in England only in that formation. M. Deshayes mentions one hundred and fifty-six as existing in the Tertiary of Europe. Forty-one are from the Paris basin and thirty-three from the Subappennines. In this country Mr Conrad is, I believe, the only geologist who has noticed the genus. At St Mary's, Maryland, he discovered seven species, which are described by him in the Journal of the Academy of Natural Sciences, vol. 6, p. 223. Neither of these is the analogue of those above described.

GENUS CANCELLARIA. *Lamarck.*

C. babylonica. Plate 5. Fig. 134.

Description. Shell turrated, inflated, smooth, substance of the shell thin; whorls six, angular, broad and flat at the top, and furnished on the angle with irregular erect spinous tubes; umbilicus wide, armed with points; mouth triangular, two fifths of the length of the shell; columella with two indistinct folds; outer lip sharp.

Length .5.

Breadth .3, of an inch.

Observations. A single specimen only of this beautiful species has come into my possession. It is very distinct from any species I know, and is eminently distinguished by the flatness of the superior part of its whorls and the spinous tubes placed along the angle. The wide umbilicus and armature of points are very characteristic.

C. multiplicata. Plate 5. Fig. 135.

Description. Shell turritid, somewhat inflated, with numerous rather oblique folds cut by transverse striæ; substance of the shell rather thick; whorls —, angular, flat at the top; umbilicus very small; mouth ovate; columella with two folds; outer lip very much thickened, edged, crenate within.

Length

Breadth .2, of an inch.

Observations. Unfortunately, I obtained but little more than the lower whorl of this species. This, however, is perfect, and displays distinct characters. The thickness of the outer lip is very remarkable, forming a large varix.

C. plicata. Plate 5. Fig. 136.

Description. Shell turritid, subventricose, with numerous large longitudinal folds on the three last whorls cut by minute transverse striæ; whorls six, angular at the top; umbilicus very small; mouth subovate; columella with two folds.

Length .4,

Breadth 3-20ths, of an inch.

Observations. This is a very distinct and beautiful species. Its large folds, together with the flatness of the superior part of the whorls, amply distinguish it. The only specimen I have seen is the one now described, and judging from the absence of folds on the first whorls and the sharpness of the outer lip, it may prove to be rather a young individual.

C. sculptura. Plate 5. Fig. 137.

Description. Shell subturritid, folded longitudinally and transversely set with numerous elevated lines; spire elevated, pointed; whorls six, subangular at the top; umbilicus very small; mouth subovate, columella with two indistinct folds; outer lip dentate within and furnished with a varix.

Length .4,

Breadth .2, of an inch.

Observations. I have seen but one perfect specimen of this species. A second one has been despoiled of its varix. It is distinguished from the *plicata*, which it resembles, in the spire being more elevated, as well as in the folds being closer. The transverse lines cutting the folds, give it the appearance of being reticulated. Between the folds very minute longitudinal striæ may be perceived under the lens.

C. tessellata. Plate 5. Fig. 138.

Description. Shell turritid, with longitudinal large ribs cut by transverse striæ which are enlarged at the junction; substance of the shell thin; whorls —, subangular,

somewhat flattened at the top ; umbilicus none ; mouth ovate ; columella with three folds.

Length

Breadth .2, of an inch.

Observations. A single imperfect specimen only having come into my possession, I am unable to give a full description of it. The spire and outer lip are both removed. Its folds are rather larger than those described above, and it differs in having three folds on the columella.

C. elevata. Plate 5. Fig. 139.

Description. Shell elevated, turritid, cancellate ; substance of the shell rather thin ; whorls seven, convex ; suture impressed ; umbilicus none ; mouth ovate, one third the length of the shell ; columella with two folds ; outer lip striate within.

Length 9-20ths,

Breadth .2, of an inch.

Observations. This pretty little species is remarkably elevated in the spire and beautifully cancellate. A single specimen only was obtained, the outer lip of which is broken. It may be easily distinguished by its elevated spire and cancellate exterior.

C. costata. Plate 5. Fig. 140.

Description. Shell rather elevated, turritid, with large, sharp, longitudinal ribs ; substance of the shell rather thin ; whorls five, subangular and somewhat flattened at the top ; umbilicus none ; mouth ovate, rather narrow, about

one third the length of the shell; columella with two folds.

Length 5-20ths,

Breadth .1, of an inch.

Observations. The strongly characterised longitudinal ribs of this species eminently distinguish it. At the base there are a few indistinct transverse striæ, but the larger part of the whorl is entirely free from them. Among those here described, this is the only one with this character.

C. parva. Plate 5. Fig. 141.

Description. Shell somewhat elevated, turritid, with large longitudinal folds cut by large elevated transverse striæ, spire elevated, obtuse at the apex; suture deeply impressed; whorls five, convex; umbilicus very small; mouth semilunate; columella furnished with two large folds; outer lip sharp, within crenulate.

Length .2,

Breadth .1, of an inch.

Observations. This truly beautiful little species is very distinct from either of the others here described. It may be at once known by its strong folds on the columella, and its large longitudinal folds and strong transverse striæ.

The genus *Cancellaria* has been observed in England only in the London Clay, from whence three species have been described.* M. Deshayes's Tables give forty-two

* Min. Conch. pl. 360 and 361.

species from the Tertiary. Sixteen are from the Subappennines (Pliocene), twelve from Bourdeaux (Miocene), and five from Paris (Eocene). In this country a single species only, *C. lunata* (Conrad), has been heretofore observed. It is from the Tertiary Beds of St Mary's.

GENUS FASCIOLARIA. *Lamarck.*

F. plicata. Plate 5. Fig. 142.

Description. Shell subfusiform, turrated, largely and longitudinally folded, transversely and alternately striate; suture irregularly impressed; whorls eight, convex; columella with two small folds; canal short, reflected; mouth ovate, two fifths the length of the shell; outer lip sharp, within striate.

Length .7,

Breadth 7-20ths, of an inch.

Observations. A very pretty species, remarkable for its large folds and well marked transverse striæ, which are alternately larger and smaller. The striæ within are strongly marked.

F. elevata. Plate 5. Fig. 143.

Description. Shell subfusiform, turrated, transversely striate on the inferior part of the last whorl; suture linear; whorls —, slightly convex, truncate along the suture; columella with three or four indistinct folds; canal short, slightly reflected; mouth ovate; outer lip sharp, within crenate.

Length

Breadth 3-20ths, of an inch.

Observations. This species differs very much from the last described. It is more elevated, without folds, has a smaller mouth, and is striate only on the lower part of the whorl. A single individual only was obtained, the apex of which is broken.

No species of *Fasciolaria* seem to have been observed in a fossil state in Great Britain. M. Deshayes in his Tables gives five species, three of which are from Dax (Miocene). In the United States none have, I believe, been noticed. The *Voluta Lamberti* of Sowerby, has been obtained by Mr Conrad, at St Mary's, Maryland. Mr C. considers it a *Fasciolaria*.*

GENUS FUSUS. *Lamarck.*

F. pulcher. Plate 5. Fig. 144.

Description. Shell fusiform, turrated, furnished with wide longitudinal folds cut by transverse strongly marked striae; substance of the shell rather thick; suture impressed; whorls —, convex; canal long, straight; mouth ovate; outer lip sharp.

Length

Breadth .3, of an inch.

Observations. A single individual only, and that with a fractured spire, has come under my notice. The two lower whorls and the canal are perfect. It is a beautiful species

* See note to observations on the genus *Mitra*.

and very distinct from any other herein described. Five or six of the striæ on the widest part of the whorl have between each of them a very minute stria.

F. Mortonii.* Plate 5. Fig. 145.

Description. Shell subfusiform, furnished with large longitudinal folds, cut by transverse striæ which are enlarged on the folds; substance of the shell rather thin; whorls six, inflated, flattened at top, subspinous on the angle; canal long and straight; mouth subrotund; outer lip sharp, within slightly crenate.

Length .7,

Breadth .3, of an inch.

Observations. A very distinct species, and remarkable for its strong folds covered by transverse striæ, which are so much enlarged on the folds as to give it a tuberculated appearance. On the angle of the whorl the superior stria is so much enlarged as to make the angle subspinous in perfect specimens—above it is without striæ.

F. decussatus. Plate 5. Fig. 146.

Description. Shell subtubinate, cancellate, furnished with seven or eight large transverse striæ, cut by numerous longitudinal small striæ; substance of the shell thin; suture deeply grooved; whorls six, inflated, biangular in

* To this species I have placed the name of the corresponding secretary of the Academy of Natural Sciences of Philadelphia, Dr Morton, who has done much to promote a knowledge of our geology

the middle ; canal rather long and flexed ; outer lip subcrenate, within sulcate.

Length .6,

Breadth .3, of an inch.

Observations. This is a beautiful little species, roughened nearly all over by decussate striæ. On the large transverse striæ there is a series of small nodules at the point of section.

F. bicarinatus. Plate 5. Fig. 147.

Description. Shell subturbinate, minutely and transversely striate, longitudinally and minutely folded above ; substance of the shell rather thick ; suture linear ; whorls —, rather inflated, bicarinate in the middle ; canal rather long and straight ; outer lip striate within.

Length .5,

Breadth .2, of an inch.

Observations. The lower part of a single individual of this species only has come under my notice. It is distinct from any other herein described. Its minute folds may be seen round the largest part of the whorls.

F. venustus. Plate 5. Fig. 148.

Description. Shell fusiform, furnished with large longitudinal folds cut by small transverse striæ ; substance of the shell rather thin ; spire elevated and acute at the apex ; whorls six, convex ; canal rather short ; mouth narrow, one half the length of the shell ; outer lip sharp.

Length .4,

Breadth 3-20ths, of an inch.

Observations. This beautiful little species is more slender than any here described, and its mouth is more contracted. The longitudinal folds being smaller on the superior whorls, and the striæ being there rather large, cause these whorls to be cancellate.

F. crebissimus. Plate 5. Fig. 149.

Description. Shell subfusiform, furnished with longitudinal folds cut by rather rough, very closely set transverse striæ; substance of the shell thick; spire rather elevated; whorls seven, convex; canal rather short; mouth subrotund; outer lip finely crenate, within dentate.

Length .5,

Breadth .2, of an inch.

Observations. This species is remarkable for its transverse striæ, which are very closely set over the whole body of the shell. In some specimens these striæ are somewhat rough, and present a slightly imbricate appearance.

F. magnocostatus. Plate 5. Fig. 150.

Description. Shell subfusiform, furnished with large longitudinal folds, cut by transverse rather large striæ; substance of the shell rather thick; spire somewhat elevated, acute at apex; whorls six, convex; canal short, oblique; mouth subrotund; outer lip slightly crenate, within dentate.

Length .4,

Breadth .2, of an inch.

Observations. This species closely resembles the last

described, but may be distinguished by its larger folds and the transverse striæ, which, though numerous over the whole shell, are not so closely set. In some specimens on the folds there is a slight imbricate appearance.

F. Delabechii.* Plate 5. Fig. 151.

Description. Shell subfusiform, furnished with rather sharp longitudinal folds cut by imbricate transverse striæ; substance of the shell thick; spire somewhat elevated, acute at apex; whorls seven, subangular; canal short, flexed; mouth subangular; outer lip crenate, within striate.

Length 13-20ths,

Breadth .3, of an inch.

Observations. This species in many of its characters resembles the two last described. It may be known, however, by its imbricate striæ and obtuse angle on the superior part of the whorl where the folds are somewhat pointed. A single perfect and mature specimen only has been observed by me.

F. ornatus. Plate 5. Fig. 152.

Description. Shell fusiform, furnished with rather oblique folds on the middle of the whorls, transversely, very minutely and alternately striate; substance of the shell thin; spire rather elevated, pointed; whorls seven, subangular; canal rather short, obliquely curved; mouth subangular; outer lip sharp.

Length .6,

Breadth 5-20ths, of an inch.

* Named after the distinguished author of the "Geological Manual," "Tabular View," &c., De la Beche.

Observations. This beautiful species differs from those above described, in having shorter folds and in being covered with minute striæ, which are alternately larger and smaller, and resemble the finest lines of the graver.

F. acutus. Plate 5. Fig. 153.

Description. Shell subfusiform, furnished with large longitudinal folds on the middle of the whorl, closely covered with transverse alternate striæ; substance of the shell thin; spire rather elevated, acutely pointed; whorls seven, subangular; canal rather short, much curved; mouth subrotund; outer lip sharp.

Length .6,

Breadth 5-20ths, of an inch.

Observations. In general outline it resembles the last described, but may be distinguished at once by the transverse striæ, which in this are not so fine. The canal is much more curved.

*F. Conybearii.** Plate 5. Fig. 154.

Description. Shell subfusiform, furnished with longitudinal folds cut by rather large transverse striæ; substance of the shell rather thick; spire somewhat elevated, pointed; whorls six; canal rather short, oblique; mouth subovate; outer lip thickened, within crenate.

Length .4,

Breadth .2, of an inch.

Observations. This species resembles the two last. It

* Named after one of the distinguished authors of the "Outlines of the Geology of England and Wales," the Rev. Mr Conybeare.

is a smaller shell and differs in having broader striæ and a shorter and oblique canal.

F. nanus. Plate 5. Fig. 155.

Description. Shell fusiform, transversely striate below the middle of the whorl; substance of the shell very thin; spire —; whorls —, subangular; canal short, obliquely curved; mouth contracted; outer lip sharp.

Length 3-20ths,

Breadth 1-20th, of an inch.

Observations. A single fractured individual only of this species has come under my view. It differs much from any of the above described. It is very minute—has no folds, and the striæ do not exist on the superior part of the whorl. The superior stria being the largest makes the whorl subangular there.

*F. Fittonii.** Plate 5. Fig. 156.

Description. Shell ovately fusiform, subturbinate, granulate on the superior whorls; substance of the shell rather thick; spire somewhat elevated, acute at the apex; whorls six, flattened above, subangular; canal short, twisted; mouth ovate; outer lip sharp.

Length

Breadth .4, of an inch.

Observations. This species strongly resembles the *F.*

* I place with great pleasure the name of a distinguished geologist to this species.

*ficulneus** (Lamarck), but differs in having no fold on the columella and being without those on the whorls. The superior whorls of the *Fittonii* are disposed to be biangular, which character is lost on the last whorls, the superior part of which is disposed to be canaliculate.

F. parvus. Plate 5. Fig. 157.

Description. Shell ovately fusiform, smooth, somewhat elevated in the spire; substance of the shell thick; spire rather elevated and pointed at the apex; suture linear; whorls six, above slightly convex; columella twisted; canal short, oblique; mouth lunate.

Length .4,

Breadth .2, of an inch.

Observations. A single individual only of this species and that not entirely perfect, has come under my notice. It forms a natural link between the last described and that which follows. The spire is more elevated than the *Fittonii*, and it differs in not having granulations, as it does also in the columella.

F. minor. Plate 5. Fig. 158.

Description. Shell fusiform, smooth, elevated in the spire; substance of the shell rather thin; spire elevated and pointed at the apex; suture linear; whorls six, very

* *Murex turgidus*, Brander, plate 4, fig. 51. *Fusus ficulneus*, Sowerby, Min. Conch. plate 291.

slightly convex, with an indistinct minute furrow below the suture ; columella twisted, with a single fold ; canal short, oblique ; mouth subovate.

Length .3,

Breadth 3-20ths, of an inch.

Observations. Of this little species I have received but a single individual. It is more elongate than that last described, and, though much like it, is specifically distinct. The three last described differ so much in general character from the type of the genus, that I have not without much hesitation placed them here. The genus *Pyrula* seems to have equal claims for them, and the example of Lamarck, followed by Sowerby, alone made me conclude to do so. The *Fusus ficulneus* of these authors is one of this group. Like it the *minor* has a fold on the columella, which has not deterred Lamarck from placing the *ficulneus* among the *Fusi*, although he says in his generic description, "columella lævis."

F. Taitii.* Plate 5. Fig. 159.

Description. Shell turbinate, ventricose, armed with two rows of spines, transversely sulcate on the inferior part ; substance of the shell very thick ; suture irregular ; spire obtuse, armed with nodulous spines ; whorls five, somewhat canaliculate above ; canal short, oblique ; mouth subrotund ; outer lip sharp, with a sinus at each spine.

Length 2 inches,

Breadth 1.3, of an inch.

* It is with peculiar gratification I place the name of my friend Judge Tait, to whose kindness I am so greatly indebted, to this fine species.

Observations. It is with much hesitation I have concluded to place this curious and truly interesting species with the *Fusi*. It has some of the generic characters of the *Pyrula*, *Murex*, and I think *Monoceres*; for, if I mistake not, the furrow immediately below the last row of spines, in perfect specimens, will be found to throw out a process very like to that of the genus last mentioned. I am induced to place it here from the example of Lamarck's *Fusus minax*, (*Murex minax*, Brander). Our shell has a striking similarity to that species, and should stand next to it wherever it may be placed. It is rather more turbinated and has a thicker columella. It is placed at the last of the *Fusi*, having a shorter and more oblique canal than those above described.

Of this widely spread genus fifteen species have been observed in England, by Sowerby, and one by Konig. Fourteen are in the London Clay, and two in the Crag.* M. Deshayes in his Tertiary Tables gives one hundred and eleven species. Forty-two of these are from the Paris basin, and he gives eight to the English Crag. M. Brogniart† observed in the Formations of Vicentin five species.

In this country Mr Say has described two species from the Tertiary of Maryland, the *quadricostatus* and *cinereus*. Mr Conrad discovered at St Mary's a new species, which he described under the name of *errans*, but that name being preoccupied, he subsequently changed it to *rusticus*.

* Mineral Conch.

† Terrains du Vicentin, p. 72.

More recently the same author has described six new species from the Tertiary of Maryland and Virginia.*

GENUS PYRULA. *Lamarck.*

P. cancellata. Plate 5. Fig. 160.

Description. Shell subpyriform, beautifully cancellate over the whole exterior; substance of the shell thick; spire rather elevated, pointed; suture small, slightly thickened above; whorls six, angular above; canal rather short and wide; mouth subovate, rather contracted; outer lip thickened, with the edge bevelled.

Length 1.4,

Breadth .7, of an inch.

Observations. Unfortunately but a single specimen of this truly beautiful shell has come into my possession. It is perfect and presents very remarkable decussating striae, which are so regularly placed as to present the appearance of *meshes*, the point of section being enlarged. This enlargement causes the angle of the whorls to be somewhat granulate. It seems from Sowerby's figure† to resemble pretty closely the *Pyrula nexilis*‡ (Lamarck), (*Murex nexilis* of Brander§). The spire is, however, more elevated, the canal shorter and the superior part of the whorl angular. The *Pyrula Greenwoodii*, figured by Sowerby, plate 498, has some characters resembling our species, but is specifically different.

* Fossil Shells of Ter. For., p. 17

† Min. Conch. pl. 331.

‡ Ani. Sans. Ver. vol. 7, p. 572.

§ Hamp. Fos. p. 4, fig. 55.

P. elegantissima. Plate 5. Fig. 161.

Description. Shell subpyriform, alternate, beautifully cancellate over the whole exterior; substance of the shell rather thin; spire rather elevated, pointed; suture small; whorls five, convex; canal rather long; mouth subovate, contracted; outer lip —.

Length .6,

Breadth .2, of an inch.

Observations. One nearly perfect, and several fractured specimens of this very beautiful species only have come under my notice. Its delicate and graceful form and highly adorned exterior render it very remarkable. It is closely allied to the preceding species, but differs in having a longer canal, in the absence of the angle on the superior part of the whorl, and in being a much smaller and thinner shell. In some of these characters it has a stronger resemblance to the *Pyrula nexilis* (Lamarck). Like it, it is without the angle. Its being more attenuate and having a higher spire makes it specifically different. The reticulation is, if possible, more perfect and beautiful than on the *cancellata*.

*P. Smithii.** Plate 5. Fig. 162.

Description. Shell pyriform, smooth, ventricose, canalliculate on the widest part; substance of the shell very

* I have placed to this species a name which will not soon be forgotten to British geologists. The veteran geologist William Smith, was almost a solitary labourer for many years in the field, and to him very much is due for the present advanced state of the science of geology in

thick ; spire slightly produced ; suture small, irregular ; whorls five, irregularly canaliculate ; columella much thickened ; canal short ; emarginate ; mouth ovate ; outer lip sharp.

Length 1.6,

Breadth .1, of an inch.

Observations. This species in its outline most resembles *P. bezoar* (Lamarck). In its minor characters it is, however, very different, being smooth. On that part of the whorl which is usually occupied by an angle, the angle is replaced by a slightly impressed furrow, and in most specimens there are indistinct ones above and below this. The seat of the umbilicus is rather impressed, and surrounded by an oblique welt terminating at the emargination. The superior part of the columella is very much thickened, and a small channel separates it there from the lip.

Four species of this genus have been observed in the London Clay of England, and none above or below it. M. Deshayes's Tables give twenty-one. Ten are from the Paris basin—seven from Bourdeaux. In the United States three species have been observed in a fossil state. The *canaliculata* and *carica* (Lamarck) have been obtained at St Mary's, Maryland. More recently Mr Conrad discovered a new species, *sulcosa*, described in the Journal of the Academy of Natural Sciences, vol. 6, page 220.

Great Britain. Appreciating his merits, the Geological Society, having previously awarded him their first Woollaston medal, publicly and appropriately bestowed it on him, at the meeting of the British Association, at Oxford, in June 1832.

GENUS MUREX. *Linnaeus.**M. alternata.* Plate 5. Fig. 163.

Description. Shell subfusiform, turritid, longitudinally ribbed, armed with erect spines; substance of the shell thin; spire elevated, pointed at the apex; suture irregular; spines tubular, alternately placed on and between the ribs; whorls seven, flat above; mouth entire, ovate.

Length .8,

Breadth .3, of an inch.

Observations. This curious little *Murex* strongly resembles the *M. pungens* (Brander), plate 3, fig. 82, (*M. fistulosus* of Sowerby), and that under the same name, fig. 81, (*M. tubifer* of Lamarck and Sowerby). It differs, however, from both. Having them in my cabinet, on comparison, I find our shell to be more elongate than either, to differ essentially from the *fistulosus* in having a longer spire and much smaller ribs, and the *tubifer* in having but one row of spines instead of four. The Murices with the mouth entire, were separated by Montfort, under the name of *Typhis*, and Cuvier has adopted it as a subgenus.

It is remarkable that among so many new species of the various genera, only one *Murex* should as yet have been found in this stratum. In England forty-seven species have been observed, nearly the whole being from the London Clay and Crag. Eighty-nine species are men-

tioned by M. Deshayes in the Tertiary of Europe—twenty-four of these in the Paris basin. Two species only, I believe, have been heretofore observed in this country. From the Tertiary of Maryland, Mr Conrad has described the *acuticosta*. From the Upper Tertiary (Conrad) of Virginia, the Miocene of Lyell, Mr C. has described the *umbifer*. It would therefore appear that three species only of *Murex* in a fossil state are now known here, while eighty-nine are known to exist in the Tertiary of Europe.

FAMILY ALATA.

GENUS ROSTELLARIA. *Lamarck*.

R. Lamarckii.* Plate 5. Fig. 164.

Description. Shell fusiform, covered with longitudinal flexed ribs cut by numerous transverse striæ, which in the adult are hidden, the whole surface being coated by a deposit; substance of the shell thick; spire elevated, acute at the apex; suture impressed, when coated as in the adult scarcely perceptible; whorls about twelve, convex in the young, scarcely perceptible through the coating of the adult; canal at the base short, above nearly erect, extending half way up the spire, where passing in a curve

* In naming this species in honour of the first conchologist of the age, I do homage to that acumen of science which now penetrates to the study of the naturalist in every quarter of the globe.

to the opposite side it descends about the same distance; mouth subovate, rather contracted; outer lip small, thin and edged below, above thick and recurved.

Length 2.2,

Breadth .7, of an inch.

Observations. This curious species of an interesting genus, presents characters unknown in any with which I am acquainted. Its most extraordinary character is that of the deposit, coating the whole of the shell thickly over except the lip; this gives it a rude unshapen appearance. It ascends and overtops the beautiful spire, and enclosing it forms a new apex above. Young specimens present so entirely a different aspect as to make it difficult to believe they are the same species. They are gracefully formed, and the superior part is covered with longitudinal, parallel, flexed ribs—fine transverse striæ cover the whole exterior surface. In this state it closely resembles the young of *R. curvirostris* (Lamarck). The figure represents a specimen with the deposit removed from the apex, in which state they often occur. Having six fossil species from Europe, in my cabinet, I am able to make the following comparisons. It differs from the *Strombus amplus* (Brander), (*Rostellaria macroptera* of Lamarck), in being without the great wing which in my largest specimen expands beyond and behind the top of the spire. It differs from the *R. longirostra* (Grateloup) greatly in the deposit, this species having little more than the columella thickened—it differs from the *R. columbata* (Lamarck), which is thickened only along the canal terminating near the apex—it differs from the *R. fissurella* (Lamarck), which is strongly

ribbed and has the seat of the canal raised, terminating near the beak—it differs from the *R. decussata* (Lamarck), which is largely ribbed and striate, and has the inferior sinus of the *Strombus* in the outer lip, and it differs from the *R. pes-pelecani* (Lamarck), which has the outer lip divided into three digitate processes.

R. Cuvieri.* Plate 5. Fig. 165.

Description. Shell subfusiform, truncate below, longitudinally folded and striate; substance of the shell thick; spire elevated, suture linear; whorls about eight, very slightly convex; canal at the base very short, above erect, terminating half way up the spire; columella thickened, reflected; mouth contracted; outer lip truncate below, thickened, edged.

Length .7,

Breadth .3, of an inch.

Observations. This species differs in most of its characters from the last. It most resembles the *fissurella* (Lamarck). The superior canal does not, however, as in that shell, extend to the apex. The inferior canal is shorter. The ribs or folds are not so strong, and the outer lip is smaller and not reflected.

This genus has a considerable range in the strata of

* In honour of one of the great masters of natural science, I dedicate this small but interesting species. No praise from me could add to the memory of one so illustrious. I place it alongside of that of Lamarck.

England. Eleven have been described by Sowerby, Phillips and Mantell, one as low as the Inferior Oolite. The highest are in the London Clay, where five species have been observed by Mr Sowerby. M. Deshayes gives eight for the Tertiary. No species has heretofore been observed in this country to my knowledge.

FAMILY PURPURIFERA.

GENUS MONOCEROS. *Lamarck.*

M. pyruloides. Plate 5. Fig. 166.

Description. Shell turbinate, inflated, transversely and indistinctly striate above and below; substance of the shell thick; transverse furrow linear, with indistinct angular points; spire short; suture small; whorls five, convex; umbilicus rather large; mouth ovate, narrow; columella thickened; outer lip sharp.

Length .7,

Breadth .5, of an inch.

Observations. This species is remarkable for its turbinate form. The superior part of the mouth is much thickened. It may be objected to, that this and the two following species should be placed in the genus *Monoceros*, as none of the specimens observed have the seat of the horn perfect. This part is therefore not described. I am satisfied nevertheless as to the genus; for the groove

or furrow, which I believe is always attendant on the horn, exists distinctly in every individual of the three species which I have. The angular points within the furrow satisfy me entirely that, when perfect specimens are procured, the horn will be found at the termination of the furrow on the edge of the lip. This furrow may be observed more or less distinct on all the recent species, at least they exist on the nine recent species which are in my cabinet. It is somewhat singular, that Lamarck should not have mentioned this furrow, which seems necessarily attendant on the horn. That naturalist describes only five species, all of which are recent.

M. fusiformis. Plate 5. Fig. 167.

Description. Shell subfusiform, rather inflated, transversely striate above and furrowed below; substance of the shell thick; transverse furrow linear, with indistinct angular points; spire rather short, subgranulate, pointed; suture small; whorls six, rather flattened; umbilicus none; mouth ovate, rather narrow; columella thickened; outer lip sharp.

Length .8,

Breadth .5, of an inch.

Observations. At first view this species might easily be mistaken for the last. In some characters, however, it is very distinct. Its being without an umbilicus at once distinguishes it. The spire is also more elevated. See the remarks on the horn of the last described.

M. sulcatum. Plate 5. Fig. 168.

Description. Shell turbinate, inflated, transversely furrowed over the whole surface; substance of the shell rather thin; transverse furrow linear with indistinct angular points; spire —; suture rather small; whorls —, convex; umbilicus none; mouth ovate, narrow; columella smooth; outer lip sharp.

Length

Breadth .2, of an inch.

Observations. A single specimen only, and that with a fractured spire, has come into my possession. The description is therefore imperfect. I am not satisfied that it is an adult. It may be found to be a larger species than here represented when more are procured, and then some of the above characters may be found to differ. It most resembles the last described. It is not so elongate a shell, and the furrows distinguish it at once. In regard to the horn I refer to the remarks on the *pyruloides*.

The Monoceros has not heretofore been observed so low in the series even as the lower Tertiary Beds. One species only in a fossil state seems to have been noticed in Europe. M. Deshayes mentions a single species and that in the Pliocene of the Subappennines. It has not heretofore been observed in the formations of this country. In M. Deshayes's Tables, six recent species only are given. My cabinet has nine.

GENUS BUCCINUM. *Linnaeus.**B. Sowerbii*.* Plate 5. Fig. 169.

Description. Shell ovately conical, minutely and transversely striate over the whole surface; substance of the shell rather thick; spire short, mammillary; suture small; whorls six, convex; mouth ovate; columella slightly wrinkled at the base; outer lip sharp.

Length .5,

Breadth .3, of an inch.

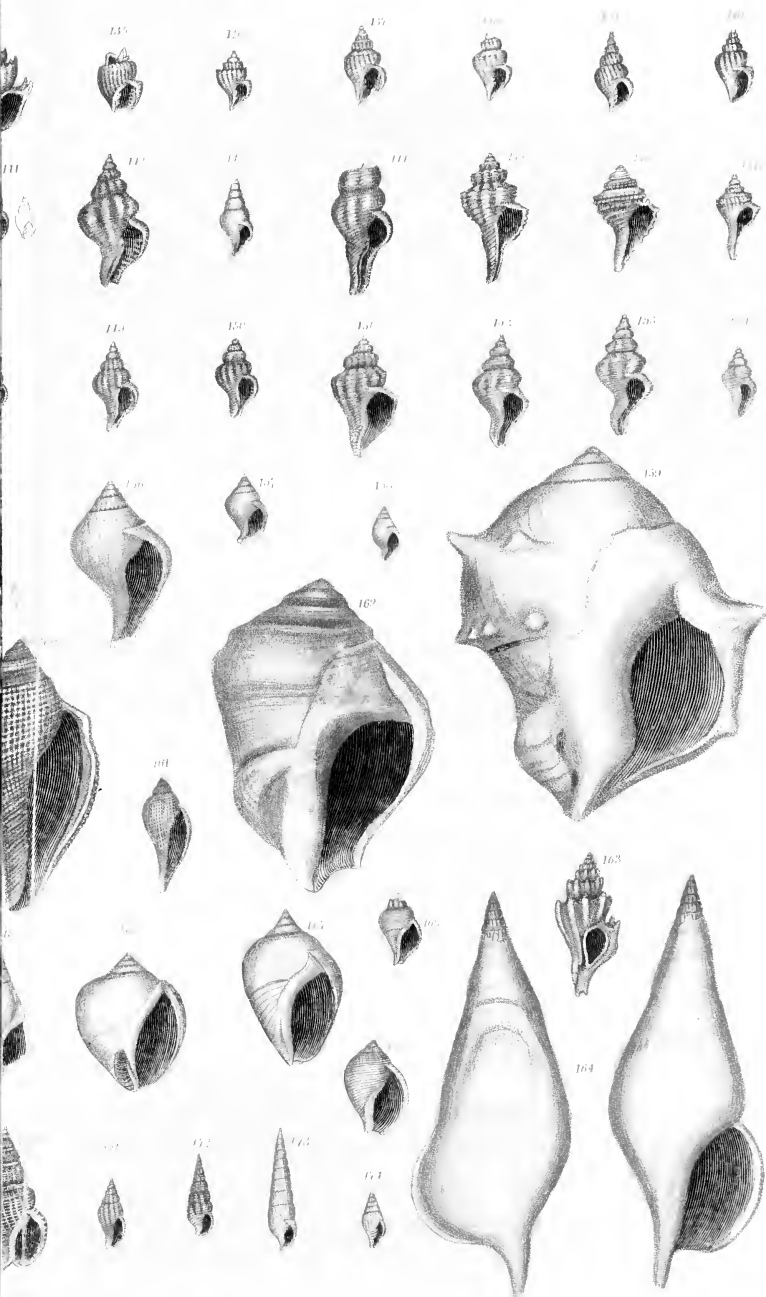
Observations. This beautiful little *Buccinum* is the only species which has come under my notice from Alabama. Its close and beautiful striæ are very remarkable.

Of this genus twenty-seven† species have been observed in Great Britain, several as low as the Mountain Limestone, but chiefly in the London Clay and the Crag. M. Deshayes gives ninety-five species for the Tertiary in his Tables. It appears to be much more abundant in the Upper Formations. The Pliocene of the Subappennines furnishes twenty-seven species, Bourdeaux (Miocene) twenty-one, Paris (Eocene) nine. In this country four species have been observed. Mr Say has described two from the

* Named after the author of the "Mineral Conchology" of Great Britain.

† These include the genus *Nassa*.

PLATE V.



CAPELLARIA

Babingtonia
multiplisata
platata
sculptura
testellata
elevata
costata
parva
pluvata
elevata
patheae
Montoni
Decussatus
biscuitinus

CAPELLARIA

PIRUS

PIRUS

139
 150
 151
 152
 153
 154
 155
 156
 157
 158
 159
 160
 161

PIRUS

lanatus
caerulatus
marginatus costatus
Belabochii
senatus
acutus
conybearii
acutus
Pittoni
parvus
minor
Taitii
cancellata
dequantiissima

162 PIRUS
 163 MUREX
 164 ROSPELLARIA
 165
 166 MONOCEROS
 167
 168
 169 BUCINUM
 170 NASSA
 171 TERREIRA
 172
 173
 174 MUREX

Sutha
atrenata
Lamarckii
Cuvieri
parvobolus
Pastoria
solitum
Sowerbi
cancellata
gracilis
costata
pinasta
lineata

older Pliocene, Maryland, and Mr Conrad two from York Town, Virginia, also the older Pliocene.

GENUS NASSA. *Lamarck.*

N. cancellata. Plate 5. Fig. 170.

Description. Shell turritid, cancellate; substance of the shell rather thin; spire elevated, not acutely pointed; suture irregularly impressed; whorls nine, subangular above and furnished with a transverse furrow; mouth ovate; columella but slightly thickened; outer lip subcrenate, striate within.

Length .8,

Breadth 7-20ths, of an inch.

Observations. This finely ornamented *Nassa* has a strong resemblance to several recent species. It is cancellate all over except at the very apex, where it is smooth and polished.

I have observed but a single species of this genus among the shells received from Claiborne. I have not hesitated to separate this genus from *Buccinum*, (although Lamarck united them after having made the division) because they certainly form a very natural group. Cuvier* separates it, as M. de Blainville† also does, into a subgenus.

As neither the English nor French geologists have

* Animal Kingdom, vol. 2, p. 374.

† Manuel, &c. p. 408.

divided the *Nassæ* from the *Buccina* generically, I am unable to quote them here.

Mr Conrad has observed in the Tertiary of Maryland four species, three of which had been described by Mr Say in a recent state from our shores.

GENUS TEREBRA. *Lamarck.*

T. gracilis. Plate 5. Fig. 171.

Description. Shell fusiform, longitudinally ribbed, transversely and closely striate, substance of the shell somewhat thick; spire not much elevated, acute at apex; suture small, irregular; whorls eight, slightly convex; mouth linear; columella striate; outer lip sharp.

Length 4,

Breadth 3-20ths, of an inch.

Observations. This pretty little species at first view might easily be taken for a *Mitra*—its twisted and striate columella, however, place it among the *Terebræ*, where it very properly may form a link with the *Mitra*.

T. costata. Plate 5. Fig. 172.

Description. Shell subulate, with low wide longitudinal ribs cut by sharp transverse striæ; substance of the shell rather thin; spire elevated, acutely pointed; suture furrowed; whorls nine, slightly convex; mouth narrow; columella biplicate; outer lip subcrenate, within striate.

Length 11-20ths.

Breadth 3-20ths, of an inch

Observations. This is a much smaller species than the last, and its sharp transverse striæ, which are much more distant, together with the folded columella, render it impossible to confound them.

T. venusta. Plate 5. Fig. 173.

Description. Shell subulate, very much attenuated, with close longitudinal ribs and minute transverse striæ in the intermediate spaces; substance of the shell thin; spire very much elevated, acutely pointed; suture linear; whorls fifteen, flattened; mouth narrow; columella smooth; outer lip —.

Length 13-20ths,

Breadth 3-20ths, of an inch.

Observations. A very distinct species from the above, being more attenuate, having a smooth columella, and being more closely ribbed. The transverse striæ, intermediate between the ribs, are very minute, while in the above two species they are larger and cross the ribs.

Four species of this genus have been observed in England: three species in the Oolitic Group and one in the London Clay. Sixteen are given for the Tertiary by M. Deshayes. Ten of these are found at Baden (Miocene), and seven at Bourdeaux (Miocene). In the Tertiary of Maryland Mr Conrad has observed one species, which he calls *simplex*, being the only one heretofore observed in our Formations.

FAMILY COLUMELLARIA.

GENUS MITRA. *Lamarck.**M. lineata.* Plate 5. Fig. 174.

Description. Shell subfusiform, longitudinally and indistinctly ribbed, furnished with a small transverse line below the suture; substance of the shell thin; spire somewhat elevated; suture small; whorls —, flattened; mouth narrow; columella with four folds; outer lip sharp; within striate.

Length .3,

Breadth 3-20ths, of an inch.

Observations. A single specimen only of this species, and that with the spire fractured, has been examined by me. The folds are placed towards the base, which causes it to look somewhat like a *Pyramidella*. The figure of Mr Murchison's *M. cancellata* from Gosau, has some resemblance to our shell.*

M. minima. Plate 6. Fig. 175.

Description. Shell fusiform, smooth; substance of the shell thin; spire somewhat elevated, rounded at the apex;

* Geol. Soc. Trans. vol. 3, pl. 39, fig. 30.

suture linear ; whorls five, flattened ; mouth narrow ; columella with four folds ; outer lip sharp, within striate.

Length 3-20ths,

Breadth 1-20th, of an inch.

Observations. Like the above, I have had but a single specimen of this species to examine. It is, however, perfect. In outline it is very like the last described, but is much smaller. It differs also in having no ribs and being without the transverse line below the suture. The folds are placed, like the above, near the base, and in this it resembles two recent species described by Pyraudeau, the *Defrancii* and *Savignyi*.*

M. fusoides. Plate 6. Fig. 176.

Description. Shell ovato-fusiform, longitudinally and closely ribbed, transversely striate above, furrowed below the suture ; substance of the shell rather thick ; spire short, rounded at the apex ; suture irregularly impressed ; whorls six, flattened ; mouth linear ; columella with four somewhat distant folds ; outer lip sharp, within minutely and closely crenate.

Length .4,

Breadth .2, of an inch.

Observations. This pretty little species differs from the two above described, in being much shorter and wider in proportion. It also differs in having transverse striæ above and having a furrow below the suture. The folds are the same in number, but placed higher on the columella, and

* Catalogue, &c. de L'isle de Corse, pl. 8, figs. 22 and 24.

are more separated from each other. In some specimens the ribs and transverse striæ are so obsolete as to present an almost perfectly smooth shell. This species very closely resembles the figure of *M. pumila** (Sowerby.) It differs in having a transverse furrow, and in the ribs being much stronger than the transverse striæ.

M. Flemingii.† Plate 6. Fig. 177.

Description. Shell fusiform, transversely and very minutely striate; substance of the shell thick; spire elevated, rounded at the apex; suture linear; whorls five, obtusely angular above; mouth contracted, nearly straight; columella with four folds; outer lip sharp.

Length .8,

Breadth .4, of an inch.

Observation. This species approaches very closely in many of its characters to the genus *Voluta*. The regular folds, however, of the columella place it strictly among the *Mitra*. It is a much larger shell than the *fusoides*—has no ribs, and is more attenuate.

M. Humboldtii.‡ Plate 6. Fig. 178.

Description. Shell subfusiform, transversely and very closely striate, canaliculate above; substance of the shell rather thick; spire —; suture linear; whorls —,

* Min. Conch. vol. 5, pl. 430.

† Named after the author of "A History of British Animals," &c.

‡ In placing the name of the Baron Humboldt to this species, I use that which is among the most illustrious in geology.

slightly canaliculate above; mouth subovate, rather narrow; columella with four folds, curved; outer lip sharp.

Length

Breadth .5, of an inch.

Observations. At first view this species might be mistaken for the above. Its curved columella and more reflected lip, however, serve readily to distinguish it. The striæ on the superior part of the whorls are stronger than on the body. Having but a single specimen, the apex of which is removed, the description is somewhat defective.

Three species* only of *Mitra* have been observed in England and those are all from Barton Cliff, London Clay Formation, having been described by Mr Sowerby in his Mineral Conchology. M. Deshayes gives sixty-six species, in his Tables, from the Tertiary. Twenty-four are from the Paris basin alone, and thirteen from the Subappennines. No fossil species have, I believe, been before observed in our Formations.

GENUS VOLUTA. *Linnaeus.*

V. Defranci.† Plate 6. Fig. 179.

Description. Shell turbinate, transversely striate, coro-

* Fleming (British Animals, p. 333,) makes a fourth, by adding the *Voluta Lamberti* to his list of *Mitra*. The genus must be considered to be very badly defined, for Mr Conrad places this species among the *Fasciolaria*, (Journal of the Acad. Nat. Sci. vol. 6, p. 216.) I should certainly agree with Mr Sowerby, and keep it with the *Voluta*.

† Named after the distinguished fossil conchologist M. Defrance.

nate ; substance of the shell rather thin ; spire somewhat produced, acute at the apex ; suture small and irregular ; whorls seven, subangular above ; mouth rather narrow ; columella with two folds ; outer lip sharp.

Length .9,

Breadth .5, of an inch.

Observations. This is the largest species I have noticed from this deposit. It occurs one half longer than the individual figured. It more strongly resembles the *V. spinosa* (Lamarck) than any species I know, but differs somewhat in the form, and in not having such strong spines on the superior part of the whorl, these in our species being replaced by very short spines or compressed tubercles. In some specimens these are disposed to be double, and in others the spines lengthen down the sides and form a kind of rib. A third, very small fold, may sometimes be observed in this species above the two large ones.

V. gracilis. Plate 6. Fig. 180.

Description. Shell ovately turbinate, transversely striate below, longitudinally and closely ribbed above, coronate ; substance of the shell thin ; spire turritid ; suture linear ; whorls six, angular and canaliculate above ; mouth narrow, straight ; columella with two folds ; outer lip sharp.

Length .6,

Breadth .3, of an inch.

Observations. This differs from the *Defranci*, in being striate only on the inferior part, and in having close longitudinal ribs. The end of the ribs are disposed to be granulate at the angle.

V. parva. Plate 6. Fig. 181.

Description. Shell subfusiform, transversely striate below, longitudinally and rather widely ribbed, with small spines on the angle of the whorls; substance of the shell thin; spire rather elevated; suture irregularly impressed; whorls six, angular and subcanaliculate above; mouth narrow, straight; columella somewhat oblique, with three folds; outer lip sharp.

Length 5-20ths,

Breadth 3-20ths, of an inch.

Observations. This is a smaller species than the last, and may be distinguished by its more tapering spire, its wider ribs and spines, which are, however, small. A single specimen only of this and the last described species having come into my possession, it may be found, in others, that the characters mentioned above are not entirely permanent.

*V. Vanuxemi.** Plate 6. Fig. 182.

Description. Shell turbinate, transversely striate on the base, with rather large spines above; substance of the shell thick; spire short; suture small; whorls five, angular above; mouth somewhat narrow; columella with two folds; outer lip sharp.

Length 1.2,

Breadth .7, of an inch.

* I have placed on this species the name of my friend, Professor Vanuxem, one of our most distinguished geologists.

Observations. This species is allied to the *Defranci*, above described, by its general form, but differs in being rather wider, in being more angular above, in having larger spines, and in having a smooth surface, except on the base. It has a stronger resemblance in its form to *V. spinosa* (Lamarck) than the *Defranci* described above, but is specifically distinct. It resembles both the *athleta* and *depau-perata** (Sowerby), but has more spines than the former, and has fewer than the latter.

V. striata. Plate 6. Fig. 183.

Description. Shell turbinate, covered with minute, transverse striæ; substance of the shell thin; spire —; suture small, irregular; whorls —, subcanaliculate above; mouth contracted, nearly straight; columella with five folds; outer lip sharp.

Length

Breadth .4, of an inch.

Observations. Differs from those described above, in the number of its folds, as well as in being without spines. It more closely resembles the *V. Cooperii* (herein described) but is less inflated, and has not, like that species, folds on the superior part of the whorls. On that part of the present species, the striæ are closer and deeper, and it is there somewhat depressed. Not having a perfect specimen, some of the characters are necessarily deficient in the description. The character of its folds approaches the *mitræ*.

* Min. Conch. pl. 396.

V. Parkinsonii.* Plate 6. Fig. 184.

Description. Shell subturbinate, very closely covered with minute, transverse striæ; substance of the shell rather thin; spire —; suture linear; whorls —, flattened above; mouth rather contracted; columella with four folds; outer lip sharp.

Length

Breadth .4, of an inch.

Observations. This very closely resembles the last species. It differs in being less turbinate, in having more closely set striæ, and in having one tooth less in number. Unfortunately, I have but one specimen, and that with the spire removed. The relative character of four or five folds, in this and the last described, may differ in other individuals. The species are, nevertheless, distinct.

V. Cooperii.† Plate 6. Fig. 185.

Description. Shell pyriform, inflated, obtusely angular above, furnished on the inferior part with about ten distinct, oblique, distant striæ; substance of the shell somewhat thick; suture small and subgranulate; spire very slightly elevated, rounded at the apex; whorls flattened above; canal very short and wide; columella with five folds; mouth long and lunate.

Length 1.2,

Breadth .9, of an inch.

* Named after the author of "Organic Remains" and "Outlines of Oryctology."

† Named after my friend, William Cooper, distinguished for his knowledge in natural science.

Observations. This species resembles the *Turbinella pyruloides* of Conrad, which, it appears to me, more properly belongs to the genus *Voluta*. It differs from it in being more turbinate, in having five folds, in having a more obtuse spire, and in the striæ being few and distant. In some of the specimens of the *pyruloides* in my cabinet, the "obscure spiral striæ" cover the whole surface of the shell.

Sixteen species have been observed in England, all in the London Clay, except one, which is found in the Crag, the *V. Lamberti*. Thirty-two are given by M. Deshayes, twenty-four being in the Paris basin. In the Tertiary of Maryland Mr Conrad has observed two species, *solitaria* and *Lamberti*,* and at Claiborne one, the *pyruloides*.†

GENUS MARGINELLA. *Lamarck.*

M. anatina. Plate 6. Fig. 186.

Description. Shell ovate, smooth; substance of the shell thick; suture slightly impressed; spire short, conical; whorls five; flattened above; columella with — folds, thickened; mouth narrow; outer lip much thickened and beautifully crenulate within.

Length 9-20ths,

Breadth .3, of an inch.

Observations. A single specimen only has come into

* *Fasciolaria Lamberti*, (Conrad). † *Turbinella pyruloides*, (Conrad).

my possession. Having been injured on a part of the columella, it is impossible to decide on the number of its folds, but presume it to be nine or ten. The front part of the shell is coated somewhat like a *Nassa*.

M. columba. Plate 6. Fig. 187.

Description. Shell ovate, smooth; substance of the shell thick; suture scarcely perceptible, spire somewhat elevated, conical; whorls —, slightly convex; columella with five folds; mouth narrow, straight; outer lip much thickened, crenulate within.

Length 7-20ths,

Breadth .2, of an inch.

Observations. Like the last described, a single individual only of this species came into my possession. In outline they resemble each other. The *columba* has not, however, any deposit or coating—it has a higher spire and a less number of folds. The folds too are different in the latter, having the appearance of being formed by the grooving of the columella, while in the *anatina* they are placed on the columella.

M. crassilabra. Plate 6. Fig. 188.

Description. Shell ovate, polished; substance of the shell thick; spire very short, pointed; whorls four, flattened above; columella with four folds; mouth narrow, somewhat curved; outer lip very thick, minutely crenulate within.

Length 7-20ths,

Breadth .2, of an inch.

Observations. This species differs from the last in being broader, in having a shorter spire, in having one fold less, and in being thicker in the lip.

M. plicata. Plate 6. Fig. 189.

Description. Shell ovate, longitudinally folded above; substance of the shell rather thick; spire short, rounded at the apex; whorls three, flattened above; columella with six folds; mouth narrow, curved; outer lip thick, finely crenulate within.

Length 5-20ths,

Breadth 3-20ths, of an inch.

Observations. Differs from all the species herein described, in having longitudinal folds, which are placed on the superior part of the whorls.

M. semen. Plate 6. Fig. 190.

Description. Shell ovato-elliptical, polished; substance of the shell rather thick; spire very short and rounded at the apex; whorls three, flattened above; columella with six folds; mouth narrow, curved; outer lip somewhat thick and very minutely crenulate within.

Length 5-20ths,

Breadth 3-20ths, of an inch.

Observations. This species seems most analagous to the last described, but is without its exterior folds, and is more elliptical.

M. ovata. Plate 6. Fig. 191.

Description. Shell ovate, smooth; substance of the shell thick; spire very short, the apex being scarcely visible; whorls flattened above; columella with eight folds; mouth narrow, curved; outer lip very slightly thickened and minutely crenulate within.

Length 11-20ths,

Breadth .3, of an inch.

Observations. This species most resembles the last described, but differs in the spire, in the number of folds, and in the size. In the adult the last whorl covers the spire except at the very apex. The thickening of the margin of the outer lip is so small as scarcely to be perceptible. In some individuals it cannot be traced. This lip is edged and somewhat gibbous above.

M. incurva. Plate 6. Fig. 192.

Description. Shell ovate, smooth; substance of the shell thin; spire somewhat protruded, rounded at the apex; whorls four, flattened above; columella curved, with four folds; mouth subovate, narrow; outer lip sharp.

Length 5-20ths,

Breadth nearly 3-20ths, of an inch.

Observations. This is placed at the last of the *Margi-nellæ*, as it has characters which approach strongly to the *Volvariæ*. It has no thickened margin on the outer lip, at least in the specimens (three) which I have seen. The

foldings are only four in number, and are placed near to the base.

The genus *Marginella* does not seem to have been observed in a fossil state in Great Britain. Seventeen species are given in M. Deshayes's Tables, nine of these are from Paris. From the Tertiary of Maryland Mr Conrad has described one species, the *denticulata*. Professor Vanuxem presented me some years since with a specimen from Charleston, S. C., taken from a bed of very recent Formation, (newer Pliocene Period,)—he did not determine its species. I suspect it to be analogous with an existing species of the West Indies.

FAMILY CONVOLUTA.

GENUS ANOLAX.* *Roissy*.

A. gigantea. Plate 6. Fig. 193.

Description. Shell ovato-elliptical, smooth; substance of the shell thick; suture scarcely visible; spire conical, acute at the apex; whorls four, flattened above; columella smooth; mouth ovate, three fifths the length of the shell, largely emarginate below and slightly so above; inner lip

* *Ancillaria* (Lamarck). I use the name of *Anolax* on the authority of M. Brogniart. See Terrains du Vicentin, p. 63.

very much thickened, swollen and projecting about the middle ; outer lip sharp.

Length 2.5,

Breadth 1.5, of an inch.

Observations. This is the largest *Anolax*, recent or fossil, I have seen. It resembles, in its general character, the *altile* and *subglobosa* (Conrad), and particularly so in the great mass of deposit on the inner lip. It differs from them in size, and in being more ovate. I have had it in my power to examine but a single specimen of this species. Other individuals may present different characters.

A. plicata. Plate 6. Fig. 194.

Description. Shell subfusiform, turrated, longitudinally folded above ; substance of the shell rather thick ; suture impressed in the callus, spire elevated, not pointed at the apex ; whorls six, flattened above ; mouth ovate, half the length of the shell ; outer lip sharp.

Length .4,

Breadth .2, of an inch.

Observations. This species most resembles the *scamba* (Conrad), but is a much smaller shell, and may at once be distinguished by its longitudinal folds.

Four species of this genus have been observed in the London Clay of England. In the Tertiary Tables of M. Deshayes we find nine. Of these five are found in the Paris basin. Mr Conrad has observed four from the same stratum at Claiborne, whence those above described were taken.

GENUS OLIVA. *Lamarck.*

O. constricta. Plate 6. Fig. 195.

Description. Shell cylindrico-fusiform ; substance of the shell rather thick ; spire elevated, pointed ; whorls six, flat above ; columella with about five irregular folds near the base ; mouth narrow, about three fifths the length of the shell.

Length .9,

Breadth .3, of an inch.

Observations. There is a great resemblance between this species and the *clavula* (Lamarck), and it may be doubtful if they should be separated. Our shell has a shorter mouth, a higher spire, and is, perhaps, more slender.

O. gracilis. Plate 6. Fig. 196.

Description. Shell subfusiform, polished ; substance of the shell thin ; spire elevated, pointed ; whorls five, slightly convex ; columella with five or six irregular folds near the base ; mouth narrow, about one half the length of the shell.

Length 7-20ths,

Breadth .1, of an inch.

Observations. The graceful form of this little species, as well as its size, will easily distinguish it from the following one. It is less cylindrical than that which precedes it, and properly placed between both, as it bears some of the characters of both.

O. Greenoughi.* Plate 6. Fig. 197.

Description. Shell fusiform, subulate ; substance of the shell thick ; spire much elevated, pointed ; whorls six, slightly impressed above the suture ; columella irregularly folded at the base ; mouth rather wide, nearly one half the length of the shell.

Length 1.6,

Breadth .5, of an inch.

Observations. This species has the most elevated spire of any *Oliva* I have seen. It has some resemblance to the *subulata* (Lamarck), a recent species, but is a more slender shell, and has a much more elevated spire. It is remarkable for its spire and the shortness of the mouth.

O. dubia. Plate 6. Fig. 198.

Description. Shell ovately fusiform ; substance of the shell thick ; spire elevated, pointed ; whorls five, slightly impressed above the suture ; columella irregularly folded at the base ; mouth wide, three fifths the length of the shell.

Length 1.5,

Breadth .6, of an inch.

Observations. This species very closely resembles the last described, but is less elongate. It has some resemblance to the *plicaria* (Lamarck), but the mouth is shorter and less open, and it is less impressed on the columella above the folds.

* Named after the distinguished British geologist, Mr Greenough.

O. Phillipsii.* Plate 6. Fig. 199.

Description. Shell ovately-fusiform, polished ; substance of the shell rather thick ; spire elevated, somewhat turritid ; whorls six, flattened above ; columella with three or four oblique folds at the base ; mouth somewhat narrow, rather more than one half the length of the shell.

Length .6,

Breadth 5-20ths, of an inch.

Observations. Differs from the other species here described, in being wider in proportion to its length, and having the spire somewhat turritid. This character is caused partly because there is no deposit along the canal. I have seen no other species among the foreign or American fossil *Olivæ*, without this deposit.

O. minima. Plate 6. Fig. 200.

Description. Shell ovate ; substance of the shell thin ; spire short and obtuse ; whorls four, rather convex above ; columella with about six equidistant folds extending high up ; mouth long, narrow and curved, being four fifths the length of the shell.

Length .2,

Breadth .1, of an inch.

Observations. This very small species differs from those above described, in the spire being short and obtuse, and

* Named after one of the distinguished authors of "Outlines of the Geology of England and Wales."

in having folds which are nearly transverse, and occupy almost the whole of the left side of the mouth.

Three species of *Oliva* have been observed in Great Britain, all being from the London Clay. Thirteen have been observed by M. Deshayes in the Tertiary ; six of these are from the Paris basin. I am not aware of the genus having before been observed in our Formations.

GENUS MONOPTYGMA.* (*nobis.*)

Description. Shell subfusiform ; mouth ovate ; columella furnished with a single fold passing obliquely into the interior of the mouth.

Observations. The peculiar fold on the columella of this shell at once separates it from any genus heretofore described. In our species, it crosses the columella equidistant from the two extremities of the mouth, in an oblique spiral manner, starting from the base. It is certainly a very interesting shell, and it is to be hoped that further investigation will bring to our knowledge other species.†

* *Μονος*, unus, and *πτυγμα*, plica.

† Since the above was written, the arrival of the ship *Georgian*, from Calcutta, has put in my possession a recent shell which should be placed in this genus. In outline it resembles a *Melania*, but the single fold on the columella, and the sinus of the base, forbid its being there placed. The lower part of the mouth presents the character of the *Cerithium*. I propose to call it *Monoptygma melanoides*.

M. Alabamiensis. Plate 6. Fig. 201.

Description. Shell ovate, smooth ; substance of the shell rather thick ; spire rather elevated ; whorls slightly incurved above ; columella furnished with a large oblique fold ; mouth narrow, subovate, emarginate at base ; outer lip sharp, within having one or two longitudinal folds.

Length .4,

Breadth 3-20ths, of an inch.

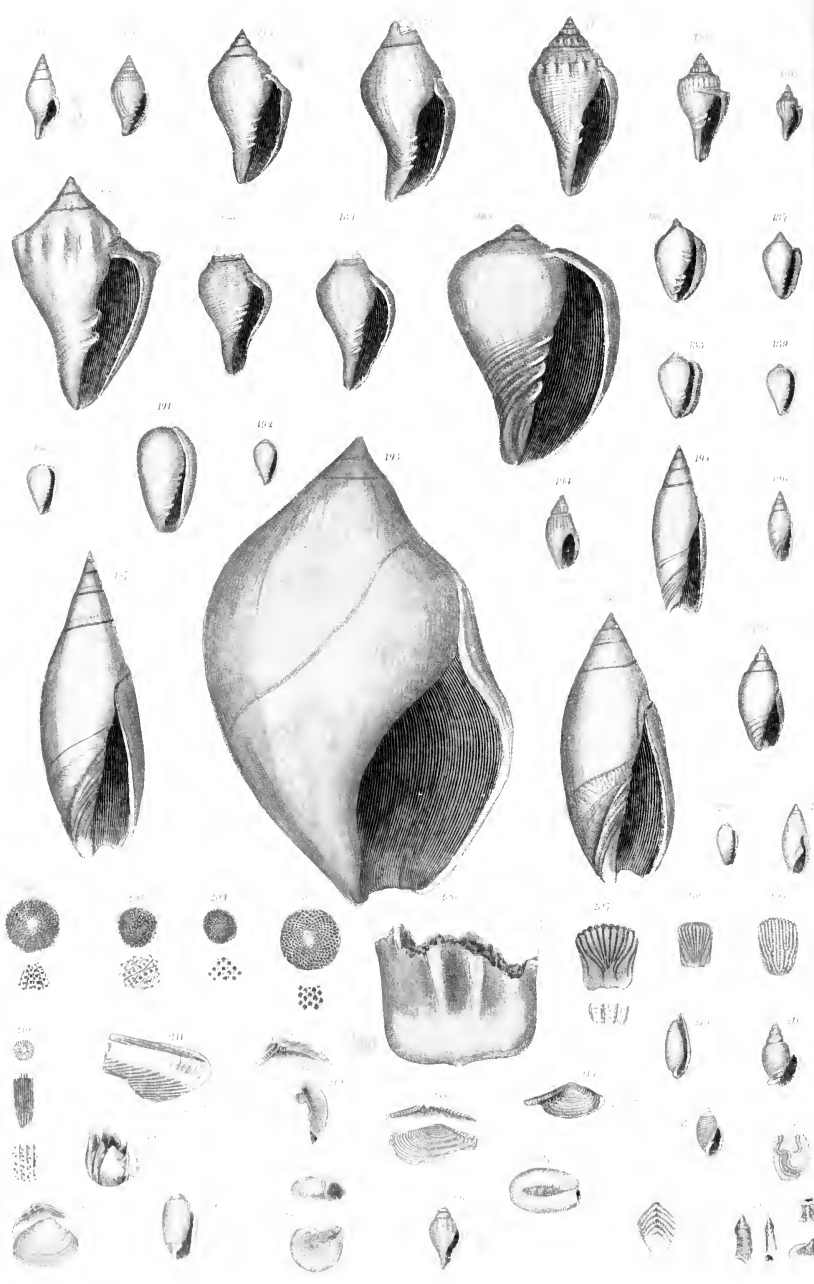
Observations. Unfortunately, but two specimens of this species were obtained, neither of which is entirely perfect. The fold is situated about the middle of the columella, and is very large. One of the specimens has but one longitudinal fold within the lip, while the other has two. The sutures are filled up by the incrustated deposit which extends to the top of the spire.

GENUS CONUS. *Linnaeus.**C. Claibornensis.*

Description. A small cone, for which I had proposed this name, was found in the sand, and by accident was mislaid, before the description and figure were made. It was about one quarter of an inch long, flattened on the sides, carinate above, and canaliculate on the superior part of the whorls ; the spire was rather low and pointed. It is to be regretted that any accident should have happened to it, as it is the only specimen of a cone found at this locality, to my knowledge.

SUPPLEMENT.

*Read before the Academy of Natural Sciences of Philadelphia,
October 29, 1833.*



175 MITRA	<i>minima</i>	189 MARGINELLA	<i>plicata</i>	203 L'ANILETES	<i>Incisa</i>	217 MONOPTYGMATA	<i>Incisa</i>
176	<i>pusilla</i>	190	<i>semita</i>	204 ORBITOLITES	<i>intusista</i>	218	<i>hinc of a Fish</i>
177	<i>El. marginata</i>	191	<i>ovata</i>		<i>dissecta</i>	219	<i>Tooth of a Fish</i>
178	<i>triarobolita</i>	192	<i>ovata</i>	206 TURBINOLIA	<i>Macleari</i>	220	<i>Veridica of a Fish</i>
179 ADOLTA	<i>tripunctata</i>	193 ANGLAN	<i>angulata</i>	207	<i>Schlesi</i>	221	<i>Spine of a Fish</i>
180	<i>angulata</i>	194	<i>plicata</i>	208	<i>calypsoii</i>	222	<i>BALANUS</i>
181	<i>parva</i>	195 OLIVA	<i>convoluta</i>	209	<i>nitida</i>	223	<i>MACTRA</i>
182	<i>Kanagami</i>	196	<i>ovata</i>	210	<i>phacelia</i>	224	<i>ACTEON</i>
183	<i>ovata</i>	197	<i>obovata</i>	211	<i>magistra</i>	225	<i>RODOLFA</i>
184	<i>Pachausii</i>	198	<i>suba</i>	212	<i>carinata</i>	226	<i>FRATRES</i>
185	<i>cooperi</i>	199	<i>Philippii</i>	213	<i>plana</i>	227	<i>MILIOIA</i>
186 MARGINELLA	<i>ovalata</i>	200	<i>nitida</i>	214	<i>semita</i>	228	<i>MOYLIUS</i>
187	<i>obovata</i>	201 MONOPTYGMATA	<i>Albatrossi</i>	215	<i>Incisa</i>	229	<i>MOYLIUS</i>
188	<i>convoluta</i>	202 L'ANILETES	<i>Incisa</i>	216	<i>MARGINELLA</i>	230	<i>capitata</i>
					<i>plicata</i>		

CLASS POLYPI.

FAMILY MILLEPORADÆ.

GENUS LUNULITES. *Lamarck.*

*Lunulites Bouéi.** Plate 6. Fig. 202.

Description. Lunulites convex and cellular above, concave and rugosely radiate below; cells in rows, diverging from the apex; pores very minute, being placed between the lines of cells.

Diam. .3,

Height 3-20ths, of an inch.

The segment is a magnified view.

Observations. This species, certainly, very closely resembles the *urceolata* (Lamarck). The cells of that species, as figured by Goldfuss, are more round than in ours. I had observed, by the aid of the microscope, that each specimen, at the apex, was possessed of a grain of quartzose sand, in some cases covered over. On examination, I found this had been observed by Brogniart and Goldfuss, to be the case with the *urceolata*; but this curious fact does not

* Named after the distinguished geologist, Dr Boué.

seem to have been observed by Lamarck. The figure of Brogniart* is much more elevated and rounded at the apex than our species.

L. Duclosii.† Plate 6. Fig. 203.

Description. Lunulites slightly convex and cellular above, concave and radiate below ; cells in rows diverging from the apex and from the sides of other rows ; pores between the lines of cells scarcely perceptible.

Diam. .2,

Height nearly .1, of an inch.

The segment is a magnified view.

Observations. Goldfuss gives a large figure of the *radiata* (Lamarck), which resembles our species. In the *Duclosii*, however, the rows of cells seem disposed to form differently, there being one or two rows which are longer than the others, and from the sides of which others again diverge. I do not observe the grain of sand in the apex of this species ; having but one or two specimens, I have not destroyed them for the purpose of examination.

I am not aware of more than one species of *Lunulites* having been observed in England. The *urceolata* (Lamarck) is mentioned by Phillips as being found in the Chalk of Yorkshire. It is also found at Grignon. Two species only have, I believe, heretofore been described, *radiata* and

* Desc. Geolo. des Environs de Paris, pl. 8, fig. 9.

† Named after M. Duclos, a distinguished conchologist of Paris.

urceolata (Lamarck). The genus has not been before observed in this country, to my knowledge.

GENUS ORBITOLITES. *Lamarck.*

O. interstilia. Plate 6. Fig. 204.

Description. Orbitolites convex and cellular above, concave, papillary and minutely porous below; cells ovate; pores above interstitial; pores below very numerous and very minute.

Diam. 3-20ths,

Height nearly .1, of an inch.

The segment is a magnified view.

Observations. This is a beautiful little species, and resembles somewhat in form the *Orbulites lenticulata** (Lamarck). It is not, however, flat beneath. There being no description of the pores, I cannot say if they differ in this character. In the two specimens which I have of this species, the grain of sand which occurs in the *Lunulites* is not observable. They were not, however, taken to pieces for examination.

* Brogniart makes the following observations in referring to the figure of this shell, "ce nom ayant été déjà donné par M. de Lamarck à une coquille de la famille des ammonites, il m'a paru convenable de restituer à ce polypier celui d'orbitolites que ce même naturaliste lui avoit donné précédemment, et qui aura été probablement altéré par mégarde." Desc. Geolo. des Environs de Paris, p. 393.

O. discoidea. Plate 6. Fig. 205.

Description. Orbitolites cellular and very slightly convex above,—minutely porous, radiate and slightly concave below; cells hexagonal; pores very minute and placed between the radiating striæ.

Diam. .3,

Height .1, of an inch.

The segment is a magnified view.

Observations. This species differs very much from the above. It is flatter and larger, and in the arrangement of the cells and pores differs altogether. The apex of my specimen (the only one I have seen) is disposed to be mammillary. The grain of sand mentioned in the *Lunulites* is not observable in this species.

A single species only of this genus seems to have been observed in England. M. Mantell in his *Geology of Sussex*, mentions the *lenticulata* (Lamarck) as existing in the Chalk. Lamarck describes six species, one of which is recent. The *macroptera* (Lamarck) is mentioned by Goldfuss, who describes this species as being found only in the Calcaire Grossiere of Paris. In this country the genus has not been before observed.

FAMILY LAMELLIFERÆ.

GENUS TURBINOLIA. (*Lamarck.*)

T. Maclurii.* Plate 6. Fig. 206.

Description. Turbinolia cuneate, minutely granulate, without ribs or furrows, swollen, furnished with two longitudinal tubercles on each side, on the superior part; base rounded; star subelliptical; pores very minute and irregularly interspersed among the granulæ; lamellæ granulate.

Diam. .6, Length .8, Breadth .9, of an inch.

The segment is a magnified view.

Observations. This very curious species differs in its exterior characters from any other I am acquainted with. It has no longitudinal striæ, which all the other known species have. No other described species has longitudinal tubercles like this. The granulæ are very small and sometimes form together. In several specimens four to eight smaller tubercles, or rather ribs, as they are elongated, may be observed on each side, but these are not specifically different. The superior part appears to be very fragile, there not being among a great number a single one entirely perfect in that part.

* Named after the distinguished geologist, William M'Clure, President of the Academy of Natural Sciences of Philadelphia.

T. Stokesii.* Plate 6. Fig. 207.

Description. Turbinolia cuneate, granulate, with twenty-four longitudinal furrows; furrows on each side ten, two of which are incurved and extend nearly to the base—on each edge two, slightly curved and extending nearly to the base; base emarginate; star elliptical; lamellæ rugose.

Diam. 5-20ths, Length 7-20ths, Breadth 7-20ths, of an inch.

The segment is a magnified view.

Observations. This is a beautiful species, resembling very slightly in outline the *T. crispa*† (Lamarck). It is, however, more cuneate, and the situation of the furrows is different. The furrows on the sides of the *Stokesii* are marked, and from the edge of the star converge nearly to a point below the centre on each side. Anxious to discover if any of the *Turbinolia* possessed the same character with some of the *Lamulites*, (the enclosing in the calcareous matter a grain of sand as a point of commencement of growth, or as a balance) I first opened specimens of the *Maclurii* without success; then specimens of the *Stokesii* and *Goldfussii*, in both of which the grain was found; several *pharetra* were next examined, but in none was it to be seen. Having but a single specimen of the *nana*, I could not submit it to an examination.

* I have placed on this species the name of the late secretary of the Geological Society of London, distinguished for his activity in promoting the knowledge of natural science.

† See Goldfuss, vol. 1, p. 15, fig. 7.

T. Goldfussii.* Plate 6. Fig. 208.

Description. Turbinolia cuneate, granulate, with twenty-four longitudinal furrows; furrows on each side ten, converging towards a point near to the middle of the base—on each edge two, slightly curved and extending nearly to the base; base nearly straight, star elliptical; lamellæ rugose.

Diam. 3-20ths, Length 5-20ths, Breadth .2, of an inch.

Observations. This species closely resembles the last. The furrows are not, however, so marked, and the two curved ones are replaced here by two which converge like the enclosed eight. It is not quite so broad, and the base is more disposed to be round than emarginate. It seems generally to be rather smaller in size. In outline as well as in the furrows there is a greater resemblance between the *Goldfussii* and the *crispa*, than there is between the *Stokesii* and *crispa*. There being no difference between the granulation of the *Stokesii* and this species, it is not considered necessary to make an enlarged view of them.

T. nana. Plate 6. Fig. 209.

Description. Turbinolia subcuneate, longitudinally ribbed; furrows apparently without perforations; ribs twenty-four, about sixteen of which descend to the base, where they are wrinkled; star elliptical; style apparently none.

Diam. 1-20th, Length .1, Breadth over 1-20th, of an inch.

* Named after Dr Goldfuss, the author of the admirable work "Petrefacten," &c.

The smaller figure is of the size of nature.

Observations. A single specimen only of this minute species came into my possession. It most strongly resembles the *pharetra*, herein described. It may be distinguished by its diminutive size, its flattened sides, its ribs and base. With a microscope of considerable power, it was not possible to discover any pores, which, I strongly suspect, exist between the ribs. In this specimen there is no style, and it may be doubted if it ever exist in this species.

T. pharetra. Plate 6. Fig. 210.

Description. Turbinolia clavate, longitudinally ribbed; furrows with a double row of minute perforations; ribs twenty-four, six of which terminate at a point on the centre of the base; six others terminate between these, higher up; these twelve being enlarged at the base, the remaining twelve, alternating, terminate above these again; star round; style rather elevated, with six radii.

Diam. .1,

Length .3, of an inch.

The superior view shows the stella of the style.

The segment is a magnified view.

Observations. In its form, this species has an almost perfect resemblance to the *sulcata* (Lamarck). It differs in the arrangement of the ribs, and judging from the figure of Goldfuss (pl. 15, fig. 3), I should suppose it to differ in the style also. The minute pores which exist in our species do not appear to be in the *sulcata*; at least they are not noticed by Lamarck or Goldfuss. Brogniart's figure*

* Desc. Geolog. des Environs de Paris, pl. 8, fig. 3.

is much better than that of Goldfuss, and apparently has pores.*

The genus *Turbinolia* seems to be more diffused throughout the different Formations than any other of the *Polypi*. In Great Britain it has been observed in the Mountain Limestone, Coral Rag, Gault, London Clay and Crag. Lamarck describes eight species, and Goldfuss nine, six of which are new.

I am not aware that any have before been observed in our Formations.

Nucula magna. Plate 6. Fig. 211.

Description. It is ventured to place this name upon the fragment of a *Nucula*, which differs on the exterior, very

* Since the above was written, I have had the advantage of examining several specimens of the *crispa* and *sulcata*, in the fine collection of P. A. Brown, Esq., who has recently received, from M. Alexander Brogniart, most of the Tertiary fossils from the Paris basin.

These specimens of the *sulcata* were observed with the same microscope to which those of the *pharetra* were submitted, and pores, similar to those described above, were distinctly observable. This character seems to have escaped Goldfuss, as well as Lamarck, and I do not know that it has been before observed by others. The relative position of the ribs of the two species are very similar. In the *sulcata* they seem to be more lamellar, and in the lower part are, in the two specimens examined by me in Mr Brown's cabinet, somewhat crenulate, which is not in the least the character of the *pharetra*. In the *crispa* there are no pores; in this character it agrees with our *Maclurii*, *Stokesii*, and *Goldfussii*; and I would propose that the genus should be divided into two sections, one with exterior pores, the other without.

much, from any species, fossil or recent, which has come under my notice. It possesses transverse folds on the sides, which lie closely to, and are beautifully parallel to each other. These terminate in a smooth plane, on the umbonial slope, which is flattened. A straight furrow, or channel, passes along the posterior dorsal margin, in which are striæ, slightly oblique. The posterior series of teeth, as far as it exists in this fragment, is straight, and possesses nineteen angular teeth. From the appearance of this part of the series, I should not be surprised if it possessed almost as many more. The substance of the shell is thick, and it is suspected, that when found perfect, it will prove to be the largest species yet described. This fragment certainly warrants such a conclusion.

N. carinifera. Plate 6. Fig. 212.

Description. Shell triangular, inflated, deeply truncate behind, minutely and concentrically striate, furnished with an elevated sharp carina on the umbonial slope; substance of the shell thick; lunule cordate; beak high, incurved and recurved; posterior slope irregularly flattened, nearly circular, and furnished with indistinct longitudinal and transverse striæ; anterior series of teeth short, consisting of five teeth, and forming a sharp angle with the posterior series; teeth rather large, angular; fosset placed above the teeth, at the point of the beak; nacre not pearly.

Diam.

Length

Breadth

The lower figure represents the posterior slope.

Observations. It is to be regretted that the description

of this curious and interesting species, has to be made from a single imperfect valve. It is eminently distinguished by its carina and broad posterior slope, from all the species described in this memoir. It has some resemblance to Sowerby's figure of *deltoidea*; and Lamarck's description of that shell, which is from Grignon, answers, in most of its characters, to ours. It is to be regretted that the posterior series of teeth should have been so much fractured as to present only two teeth; these are the superior ones.

N. plana. Plate 6. Fig. 213.

Description. Shell an obtuse triangle, very transverse, very much compressed, concentrically striate, and transversely folded on the side, sulcate on the umbonial slope; substance of the shell thin; beaks obtusely angular, pointed; lunule and escutcheon both nearly linear; anterior series of teeth straight; posterior series of teeth incurved; teeth small, numerous, angular; fosset large, subtriangular; cicatrices imperceptible; cavity of the shell very flat, showing the transverse folds; nacre not pearly.

Diam.

Length

Breadth

Observations. A single and imperfect valve only of this species has come under my notice. There are, however, characters enough remaining, to satisfy me of its being different from those before described. It most resembles the *pulcherrima*.* That shell has not, however, the remarkable folds and striæ of this species. These striæ, on

* See page 84.

the anterior part, are combined, two or three together, leaving a furrow between each association. On the posterior part, these striæ are single, but disordered by the transverse folds, which exist only on that part of the valve.

N. semen. Plate 6. Fig. 214.

Description. Shell transversely elliptical, rather inflated, furnished with large concentric folds and with a deep furrow on the anterior slope, rostrate behind; substance of the shell rather thin; lunule and escutcheon both lanceolate; beaks small, rather pointed; margin entire; nacre not pearly.

Diam. 1-20th, Length .1, Breadth 3-20ths, of an inch.

The smaller figure is of the size of nature.

Observations. A single specimen only of this species has come under my notice. It consists of the two valves attached. I endeavoured to separate the valves to examine the teeth, but with the greatest precaution was unable to effect it, one of the valves becoming fractured; therefore, the teeth are not mentioned in the description. This is a very minute species, remarkable for its large concentric folds and the deep furrow on the posterior slope. It has some resemblance to the *mucronata* of Sowerby, Min. Conch., pl. 476.

*Bulla Dekayi.** Plate 6. Fig. 215.

Description. Shell subfusiform, transversely striate

* Named after my friend Dr Dekay of New York.

above and below ; substance of the shell thin ; spire umbilicate ; whorls compressed above ; columella twisted and reflected at the base ; mouth linear, curved, extending above the spire ; outer lip sharp.

Length 7-20ths,

Breadth 3-20ths, of an inch.

Observations. This species might at first view be taken for the *St Hillairii*, but may, on examination, be readily distinguished by its conical top. I have found it much rarer in this deposit, having been able to obtain but three specimens, while the other exists in great numbers. It is not cylindrical, like that species, but rather disposed to be conical above. They also differ in the base.

Marginella biplicata. Plate 6. Fig. 216.

Description. Shell pyramidal, transversely striate, emarginate at base ; substance of the shell thick ; spire elevated, pointed ; whorls four, rounded ; columella with two large folds ; mouth small ; outer lip very thick and minutely crenulate within.

Length over .1,

Breadth .1, of an inch.

The smaller figure is of the size of nature.

Observations. On the superior part of the whorl the absence of a stria makes rather a broad band, above which is a single stria only. This is near the suture, and on the superior whorls it is the only one visible. With a good deal of hesitation I have placed this minute shell with the *Marginellæ*. Its elevated spire and emarginate base would seem almost to forbid its being placed with them.

It has some of the generic characters of the *Pyramidella*, but the varix and crenulated inner edge would not permit its being placed in that genus. In some characters it resembles a *Cassis*, particularly in the lip and emargination, but the genus *Cassis* is without folds on the columella. On comparing the *biplicata* with M. Deshayes's figure of *Auricula ringens** (Lamarck), I have no hesitation in saying that the two species are very much alike, and belong to the same genus; but I cannot see the propriety of placing them with the *Auriculæ*, these being as expressly stated by Lamarck "land shells."† Another objection may be mentioned, that of their both having a deep emargination at the base. Lamarck says, in his generic description, "basi integerrima." Our species differs from the *ringens*, in having a more elevated spire, in having a band on the superior part, and in the number of folds. M. Deshayes's figure presents three distinct folds, while the description says "biplicata." Lamarck, in his description of this part, says "subtriplicata." The observations of Lamarck on the *ringens*, apply to the *biplicata*, "Petite coquille fort singulière, qui est très-voisine par ses rapports de notre *tomatelle piétin*." The *piétin* is now a received genus under the name of *Pedipes* (Adanson), and it occurred to me before I saw Lamarck's observations, whether it might not be placed there, to which, however, there are objections.

* Coquilles Fossiles, pl. 8, figs. 16 and 17.

† Ainsi le genre dont il est ici question ne comprend que des coquilles terrestres. An. Sans Vertèbres, vol. 6, pt. 2, page 137.

Monoptygma elegans. Plate 6. Fig. 217.

Description. Shell ovately elliptical, transversely and closely furrowed; furrows closely set with punctures; substance of the shell thin; spire —; columella furnished with rather a small oblique fold; mouth elliptical, effuse at base; outer lip sharp.

Length

Breadth 3-20ths, of an inch.

Observations. This very interesting shell, in its general form, does not very closely resemble the *M. Alabamiensis** (nobis); the single fold on the columella alone, would cause them to be recognized as the same genus. In the *elegans* the numerous punctured striæ resemble closely the *Acteon punctatus*† (nobis). Having but a single specimen, the superior whorls of which are deficient, the description has to be necessarily defective.

The Eocene of Claiborne, like the London Clay of England, has presented remains of other classes than the *Conchifera* and *Mollusca*. In the sand was found a part of the pincer of a *Cancer*—two small vertebræ, probably of a fish—a stony substance resembling a section of what Brander figures under the name of *Palatium Piscium*‡—a stony substance, somewhat resembling in form the elliptical bone, found in the head of fish—teeth of sharks of several different species—the spine of a fish, and a curious tooth

* See page 186.

† See page 111

‡ Fossilia Hantoniensia, pl. 9, fig. 117

strongly resembling some of the smaller *Saurians*, but which probably belonged to a fish.

Plate 6. Fig. 218.

Description. This figure represents one of the fossils mentioned above. It resembles the bone found in the head of fish. It is subelliptical, curved—on the inferior part irregularly impressed—on the superior part smooth with a rather irregular longitudinal impression like a tulip having a curved stem. In some specimens this is very perceptible, in others it is obsolete. Two specimens were found in some sand from the Older Pliocene of Maryland, at St Mary's.

Plate 6. Fig. 219.

Two views, front and lateral.

These figures represent the tooth mentioned above. A single specimen only was obtained. Considering it of much importance in the history of the stratum, it was submitted to the examination of my friend Dr Hays, whose experience in this branch of Natural History is so advantageously known. His note, embracing also observations on two other specimens of organic remains, which accompanied it, will be found below.*

* My Dear Sir,—I have examined the fossils you were so kind as to send me, with as much attention as my pressing avocations would permit.

1. The tooth appears to be that of a fish, but I am unable to determine the species; probably it belongs to an undescribed one. Its crown is lanceolate, projects laterally, slightly beyond the body, and the enamel

Plate 6. Fig. 220.

Description. This is rather the longer of the two vertebræ, which probably belong to some species of fish. Though somewhat different in proportions, they most likely belong to the same species.

Plate 6. Fig. 221.

Description. This represents the spine mentioned above ; a single specimen only was obtained.

descends lower at the sides, than in the centre. The edges are perfectly smooth.

The root of the tooth is single, and remarkably large ; it gradually increases in size, from the neck downwards ; it is partly hollow ; its exterior aspect is convex, in both directions. Its total length is five twentieths of an inch, its breadth, at the base of the crown, one tenth of an inch.

2. The two vertebræ appear also to appertain to some minute species of fish. They each consist of two hollow cones, united at their apices, and with slender and irregular longitudinal ridges. One of them is three twentieths of an inch long, and one tenth in diameter. The other is one tenth of an inch long, and one tenth in diameter.

3. The spine resembles, exceedingly, the spines found on the tail and back of some of our species of Ray, (the *Raia Desmarestia*, Lesueur, for instance). It is discoidal at base, and its point rises rather obliquely.

I am very truly yours, &c.

ISAAC HAYS.

Sansom and Eighth streets, October 1, 1833.

NOTE.

Not having had the advantage of examining M. Deshayes's admirable work on the fossil shells of the Paris basin, until after a part of the foregoing descriptions were printed off, it has, necessarily, been out of my power to make any comparisons with his species. The following seem important enough to be introduced here.

Pasithea umbilicata (nobis), page 103, resembles M. Deshayes's figure (Coquilles Fossiles, pl. 9, figs. 1 and 2,) of Lamarck's *Bulinus terebellatus*.

All the species figured by M. Deshayes as *Melania*, in pl. 13, vol. 2d., and part of those of pl. 14, belong to the genus *Pasithea* (nobis). It must be evident, to every geologist, that the division of fresh water and marine shells, is all important, involving facts of the highest interest, as regards alternate strata, such as exist in the Paris basin. If we do not make the breathing of salt and fresh water a sufficient character, as well as that of breathing air, for generic distinction, we cut ourselves off from the use of a most valuable characteristic, to designate the strata of groups, see p. 99.

Venericardia rotundata (nobis), resembles *V. squamosa*, of Lamarck, as figured by M. Deshayes, pl. 26, figs. 9 and 11.

Pectunculus obliqua (nobis), resembles *P. nanus* of M. Deshayes, pl. 36, figs. 4 and 5.

Ostrea divaricata (nobis), resembles *O. flabellula* of Lamarck, as figured by M. Deshayes, pl. 63, figs. 6 and 7.

Solen Blainvillii (nobis), resembles *Solen effusus* of Lamarck, as figured by M. Deshayes, pl. 11, figs. 24 and 25.

NEW TERTIARY FOSSIL SHELLS,

FROM

MARYLAND AND NEW JERSEY.

Read before the American Philosophical Society, Nov. 1, 1833.

*Description of six new species of Fossil Shells from the
Tertiary of Maryland and New Jersey.*

THE shells here described, are from that part of the Tertiary mass called by Mr Lyell the older Pliocene Period. They are presumed to be new, and their descriptions are presented as a small contribution towards the elucidation of that part of our Geology.

BALANUS. *Bruguière.*

*Balanus Finchii.** Plate 6. Fig. 222.

Description. Shell short, conico-cylindrical, smooth, nearly erect; substance of the shell rather thick; aperture nearly square; valves rather pointed above.

Length 5-20ths,

Breadth .3, of an inch.

St Mary's, Maryland. John Finch.

Observations. Although this shell has no striking character, it cannot be placed with any species I am acquainted with. I am under obligations to Mr Finch, for this and many other species from St Mary's. He very kindly placed them in my cabinet, shortly after his return

* Named after the geologist to whom I am indebted for the specimen

from the examination of that celebrated deposit, about nine years since.

In Great Britain three species of *Balanus* have been observed, all in the Crag. I am not aware that any species of this genus has been before described from our Formations.

MACTRA. *Linnæus*.

M. clathrodon. Plate 6. Fig. 223.

Description. Shell subtriangular, thin, inequilateral, obscurely and transversely striate; beaks somewhat pointed; lateral teeth crossed by equidistant minute striæ; excavation of the palleal impression small and rounded; anterior and posterior cicatrices scarcely visible; cavity of the shell somewhat deep; cavity of the beaks rather deep.

Diam. .2, Length 5-20ths, Breadth 7-20ths, of an inch.

St Mary's, Maryland. John Finch.

Deal, New Jersey.*

Observations. In outline this species is somewhat like *M. Grayi* (nobis), but differs greatly in solidity. It has some resemblance to the *lateralis*† (Say), differing, how-

* It is with some hesitation that I give this locality. The specimens are in my cabinet, labeled with this locality, but I cannot recollect on whose authority.

† A recent species Journal of the Academy of Natural Sciences, vol. 2, p. 309

ever, in being less angular, less ventricose, in being without the flattened posterior slope, and in having striated lateral teeth.

ACTEON. *Montfort.*

*A. Wetherilli.** Plate 6. Fig. 224.

Description. Shell cylindrical, truncate above, smooth ; substance of the shell somewhat thick ; spire short and truncate ; suture impressed ; columella with one fold ; whorls four ; mouth narrow, about four fifths the length of the shell ; outer lip simple.

Length nearly .2,

Breadth .1, of an inch.

Deal, New Jersey.

The smaller figure is of the size of nature.

Observations. I have seen no species of this genus with whorls so compressed as this. Its short spire, together with this character, give it the appearance of a *Volvaria*. It differs from any species with which I am acquainted, in having a shorter spire, and a longer mouth.

* Named after my friend J. Price Wetherill.

ROTELLA. *Lamarck.*

R. nana. Plate 6. Fig. 225.

Description. Shell orbicular, flattened above, smooth, margin rounded ; substance of the shell rather thin ; spire nearly concealed ; outer lip sharp ; callus impressed in the centre, bounded by a fine impressed line ; mouth nearly round.

Length 1-20th,

Breadth nearly .1, of an inch.

St Mary's, Maryland. John Finch.

The smallest figure is of the size of nature.

Observations. This very minute *Rotella* is very much flattened above, and the last whorl nearly covers over the spire. The number of whorls is doubtful ; perhaps they do not exceed three. The margin is rounder than usual in this genus. A single specimen only has been observed by me, and this was discovered in the sand, taken from the cavity of a larger shell.

I am not aware that the genus *Rotella* has before been observed in a fossil state, in this country or in Europe. M. Deshayes gives in his Tertiary Tables four recent species, but none fossil.

GENUS FUSUS. *Lamarck.**Fusus pumilus.* Plate 6. Fig. 226.

Description. Shell ovately fusiform, longitudinally ribbed; substance of the shell thin; spire rather obtuse; suture impressed; whorls four, slightly convex; columella slightly twisted; canal short; mouth narrow.

Length .1,

Breadth 1-20th, of an inch.

St Mary's, Maryland. John Finch.

The smaller figure is of the size of nature.

Observations. Three specimens of this very minute species were found in the sand, taken from the cavity of a larger shell. The description of the *F. minutus* of Lamarck, from Grignon, seems to answer closely to our species, but the latter has no transverse striae.

GENUS MILIOLA. *Lamarck.**M. Marylandica.* Plate 6. Fig. 227.

Description. Shell elliptical, depressed in the middle, rounded at the edges, lobes in contact; mouth small, round, terminal, furnished with a large tooth.

Length 1-20th,

Breadth nearly 1-20th, of an inch.

St Mary's, Maryland. John Finch.

The smaller figure is of the size of nature.

Observations. This species was obtained from the sand removed from the cavity of a large shell. In some of its characters, it answers the description of the *planulata* (Lamarck). It differs from the *saxorum* of Blainville, in having the lobes in contact, and in having the mouth terminal. In his figure it appears to be lateral. The most striking character of our species seems to be, that it possesses a large tooth, which partly fills the aperture. This, I believe, has not been before observed in any described species.

Lamarck describes four fossil species; three are from Grignon, and one from Louvres, near Paris. It has not before been observed, I believe, in this country.

NEW GENUS OF FOSSIL SHELL,

FROM

NEW JERSEY.

Read before the American Philosophical Society, Nov. 1, 1833.

Description of a new genus of the Family SPHERULACEA of Blainville, from the Cretaceous deposit of Timber Creek, New Jersey.

GENUS PALMULA. (*nobis.*)

Description. Shell palmate, with angular striæ, which indicate the interior chambers; aperture terminal.

Observations. Two specimens of the shell on which I propose to found this genus, were found by me, about four years since, in the Cretaceous deposit of Timber Creek, New Jersey. In its characters it approximates most closely to the genus *Saracenaria** of DeFrance. The oval form, the possession of a carina, and the absence of an aperture in that genus, prohibit our shell being placed with it. The *Palmula* also resembles the genus *Textularia* of the same author, and might, perhaps, with propriety be placed between these two genera.

P. sagittaria. Plate 6. Fig. 228.

The smaller figure is of the size of nature.

Description. Shell depressed, sagittate, rounded on the

edges, with about six angular striæ, which indicate the interior chambers; mouth terminal, oval, sublunate.

Diam. 1-20th, Length .2, Breadth .1, of an inch.

Observations. The two specimens differ somewhat in outline, the larger one being more elliptical. In both, the angular striæ become obsolete at the base, being most distinct on the superior part.

TUFACEOUS LACUSTRINE FORMATION

OF

SYRACUSE, ONONDAGA COUNTY, N. Y.

Read before the American Philosophical Society, Nov. 1, 1833.

*Tufaceous Lacustrine Formation of Syracuse, Onondaga
County, New York.*

My attention was attracted, some years since, on my way to Niagara, when passing through the canal, which cuts the district of country a few miles east of Syracuse, in the state of New York, by a level area of some miles in extent. On descending from the boat at the locks, I found the substratum, which lined the side of the canal, to consist of a calcareous marl of a whitish colour, bordering on that of ashes, friable, and rather soft to the touch.* Numerous perfect specimens of the genera *Lymnea*, *Physa*, *Planorbis*, *Paludina* and *Ancylus* were obtained, all being analagous to the species inhabiting, at this time, the fresh waters of that region: it was evident that the deposit was caused by the drainage of a lake. The specimens were found to be completely bleached, and were generally in an unbroken state. It has been a matter of regret to me, that circumstances did not permit me to make a more minute investigation of this interesting deposit, which must be considered as a true tufaceous lacustrine deposit. I crossed it on a line, east and west, of about two miles, but its width and depth I could not ascertain.

* A subsequent analysis, by Professor Vanuxem, proved it to be nearly pure carbonate of lime.

Near Chitteningo, fifteen miles east of Syracuse, I observed, on my return, a deposit of the same kind, and it then occurred to me, it might be an extremity, or branch, of that of Syracuse. The fact, however, of the streams which pass these two villages, emptying themselves, the one into Onondaga Lake, the other into Oneida Lake, points to the probability of their being two distinct deposits.

The chief object in throwing my notes together, and making these observations, is the hope of inducing some naturalist, who has more time, and may not be so far removed from the spot, to devote some attention to obtaining all the species which may be there deposited, and to ascertain, with some degree of precision, its extent. I doubt not but that all the species found in the neighbouring lakes will be discovered in this marl, even the *Naiades*. In passing rapidly along, I thought I could perceive much larger species than those which were gathered, during the few minutes I was on shore.

A lacustrine formation, of so recent a nature as this appears to be, is not, I believe, of frequent occurrence. It is the result, however, of one of those causes which are now in action; and another instance might be mentioned, in which the effect of this cause, though striking, has not advanced to that period when it would make a finished deposit. I mean the small lake, or pond, in Sussex county, New Jersey, well known by the descriptive name of Milk Pond.* Here countless myriads of bleached shells, of the

* It takes its name from the milky appearance of the waters, near the shore, caused by the mass of bleached shells deposited there. In Gordon's Map of New Jersey, it is named White Pond.

families *Lymnæana* and *Peristomiana*, analagous to the species now inhabiting the adjacent waters, line and form the shores of the whole circumference of the lake, to the depth and breadth of many fathoms. Not having visited this interesting lake myself, I repeat what has been communicated to me by intelligent, scientific friends, who have examined it, and on whose report the most implicit reliance may be placed. Such is the quantity of bleached shells now remaining there, that thousands of tons of these small species, in a state of perfect whiteness, could be obtained, if any useful purpose required the removal of them. For agricultural purposes, this mass might prove of great utility. One friend, I remember, mentioned to me, that he had obtained a sharp pointed pole, which he inserted ten or twelve feet perpendicularly into the mass, on the shore, near to the edge of the water, without its having passed through it. As far as can be ascertained, this mass seems to form the whole basin of the lake, and it may, at some future, and, perhaps, not far distant period, form a tufaceous lacustrine deposit, similar to that at Syracuse.

These very circumscribed deposits are of no very great geological importance, but they indicate to us, in a small way, the processes by which nature has formed those lacustrine deposits which are of a wider extent, of more ancient origin, and which compose part of nearly all the groups which Mr Lyell divides into Metamorphic, Plutonic, Volcanic, Freshwater, Marine and Alluvial.*

* Principles of Geology, vol. 3, pp. 374, 386.

De la Beche very justly remarks, that "all the examples hitherto produced of deposits that can be fairly traced to existing springs, are relatively unimportant," "though they may lead us to understand how great geological deposits may, chemically, have taken place, as the cabinet experiments of the chemist teach us the laws which govern nature on the large scale."*

We have, in the Geological Description of the Environs of Paris, by Brogniart, p. 274, some account of the Freshwater Formations, posterior to the Calcaire Grossier, which exist in Europe. They are found in Spain, France, England, Switzerland, Germany, Hungary and Italy. These, however, are more ancient than the deposit at Syracuse. It is necessary to bear in mind that these deposits are entirely distinct from that which Brogniart calls "calcaire lacustre inferieur," which lies immediately over the Calcaire Grossier, in the Paris basin, contains extinct species, and forms there a most important stratum of the series.

We have an example of the strata of an age contemporaneous with that of Syracuse, in the valley of Elsa, in Tuscany. Here, Mr Lyell says, "we meet with fresh water marls and travertins full of shells, belonging to species which now live in the lakes and rivers of Italy."† He tells us also, that valleys, several hundred feet deep, have been excavated through lacustrine beds.

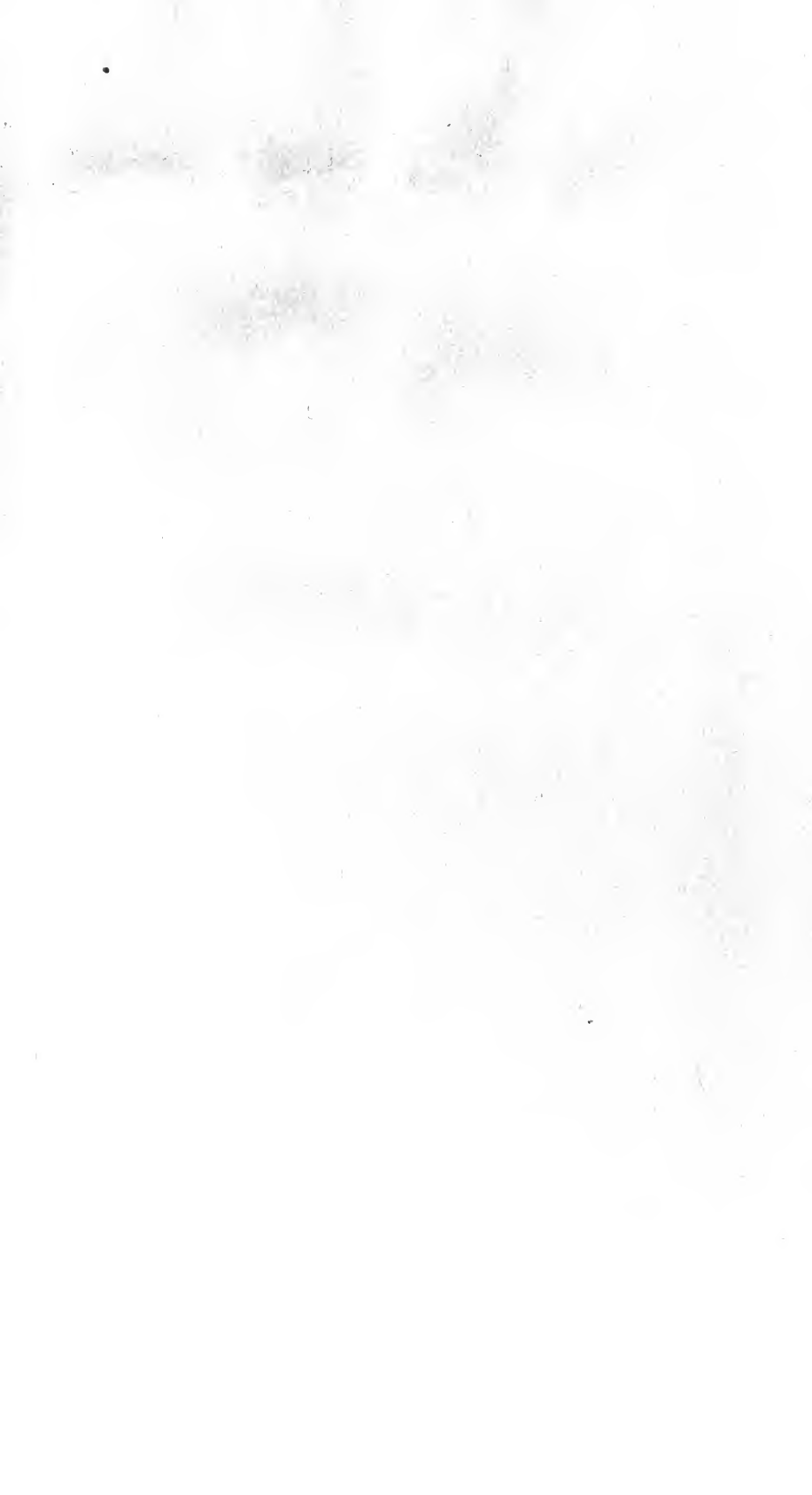
In the Geological Transactions, volume second, the same author mentions other calcareous deposits, which

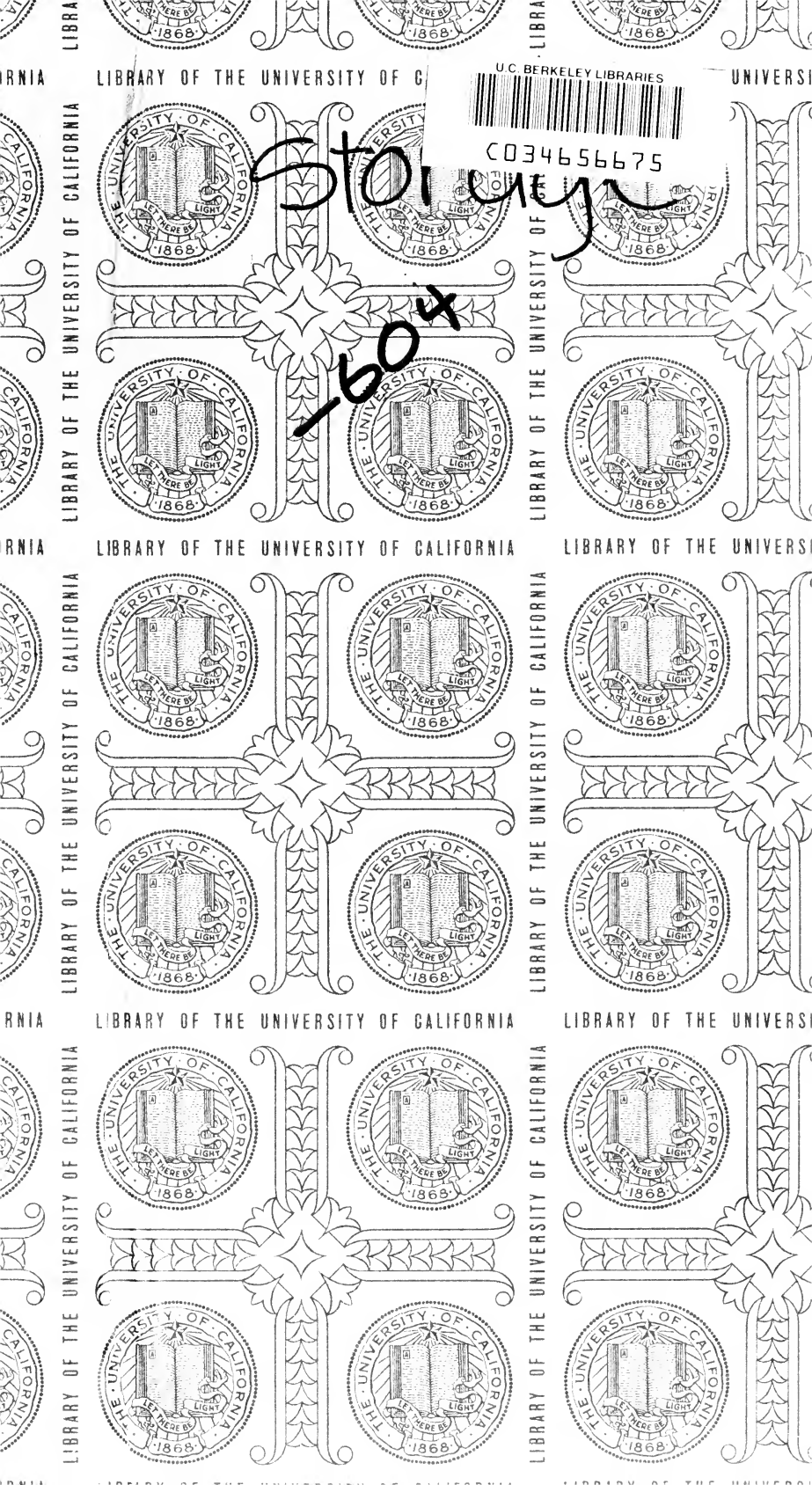
* Geological Manual, p. 138.

† Principles of Geology, vol. 3, p. 137

are similar to that of Syracuse. The Bakie Lock in Forfarshire, has made a deposit of calcareous matter, which has been found useful for agricultural purposes, and this he attributes to the agency of shells which inhabited the lake.

THE END.





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