

IV.—ON THE WEST INDIAN TERTIARY FOSSILS.

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(PLATES XVI., XVII., AND XVIII.¹)

§ 1. INTRODUCTORY REMARKS.

IN the GEOLOGICAL MAGAZINE (Vol. IV. p. 496) I have given some notes on West Indian Geology, with descriptions of a few new species of fossils. The notes were intended, in part, as supplementary to the papers published in the Journal of the Geological Society, and in the GEOLOGICAL MAGAZINE, on the Geology and Palæontology of the West Indies, and in part to exhibit an improved classification of the Caribbean upper and middle Tertiaries.

Mr. Vendryes, an ardent naturalist and zealous collector of shells and fossils in Jamaica, has kindly forwarded to me a fine set of the Miocene fossils of that island. These have been in my possession for some time: but although several novelties are contained in the collection, want of time and opportunity has hitherto prevented my working them out. The high interest attaching to these fossils has, however, induced me to draw up descriptions of the new species, and to indicate those which, although previously described from other localities, are now for the first time added to the Jamaican list.

I propose now to give a list of all the organic remains hitherto found in the West Indies (as far as described) belonging to the subkingdoms Mollusca, Articulata, Echinodermata, and Protozoa. I do not enumerate the post-Pliocene fossils, as, for the most part, they are of existing species only. The Corals have been amply treated of by Prof. Duncan, F.R.S., in late volumes of the Journal of the Geological Society.² The columns of the table appended hereto are arranged in the order of the presumed antiquity of the deposits occurring in the localities named at their heads. I should remark that the observations of Mr. P. T. Cleve and others, as well as my own, lead me to substitute the term "Eocene" for the term "Lower Miocene," hitherto employed for the Manzanilla and San Fernando beds in Trinidad, and for certain deposits of similar age discovered by Mr. Cleve in St. Barts.

There are yet a considerable number of undescribed fossils known from Haiti, of which there are examples in the Museum of the Geological Society. There is little doubt that very many of the blanks in the table now given will be filled up after further search. It is probable that most of the Miocene mollusca will, sooner or later, be found in nearly all the localities where formations of that age exist in the Caribbean area; though various local circumstances, such as depth and clearness of water, conditions favourable, or the reverse, for preservation of organic remains, or those of particular kinds, must be allowed to have due consideration. The fossil fauna of the Eocene deposits which stands out as a group quite distinct from,

¹ These three plates will appear with the concluding portion of the paper next month.—Edit. GEOL. MAG.

² See Quart. Journ. Geol. Soc., vol. xix. p. 406 and p. 513; xx. p. 20 and p. 358; xxi. p. 1; and xxiv. p. 9.

though containing some species in common with, that of the Miocene deposits, will be found hereafter to have a very much larger number of species than we have hitherto noticed. In the San Fernando beds, whose age we now state as Eocene, are many mollusca whose condition is such that, although we may venture to assign to them their generic position, it would be unwise to describe new species from such imperfect material. As regards the Foraminifera, I believe that the differences between the faunas of the several deposits depend more upon bathymetrical conditions than upon anything else.

The determination of the geological age of the Jamaica beds and of the remarkable relations of the fossil fauna of the West Indian Miocene to that of Europe and the living fauna of the eastern seas, is strikingly supported by the new fossils now described. We have a *Murex*, an *Ovulum*, a *Cassis*, and a *Fasciolaria*, whose nearest congeners are European Miocene and Asiatic recent; a *Scalaria*, previously described indeed, but from inadequate material, whose relations are similar, and a *Naticina*, a genus almost extinct in the West Indies, but whose present distribution is along the path pointed out as that of the migration of organized beings during the Tertiary period from America to the Pacific Ocean through North Africa and South Europe.

Among the Jamaica shells there are few, e.g. *Turbo castaneus*, *Strombus pugiloides*, and *Plicatula vexillata*, which, like the *Conus fuscocingulatus* of the European Miocene, retain traces of the colouring which ornamented them while living. It is only where the strata are of such composition as to be extremely favourable to the preservation of molluscan remains, that such a circumstance could occur. In Jamaica and Haiti the Miocene formations have been remarkably suited to this end, and hence we have from them a series of organic remains scarcely surpassed in beauty even by those of Bordeaux, Dax, or Paris. In Trinidad the shells of similar age are for the most part extremely altered, and their characters more or less obliterated. It is therefore fortunate that we have those of Haiti and Jamaica upon which to found and rectify our determinations of the Trinidad rocks and fossils of like age.

§ II.—DESCRIPTION OF THE FOSSILS.

Hyalæa (Diacria) Vendryesiana, Pl. XVII. Figs. 2a, 2b.

Shell elongate, smooth; both valves somewhat inflated, but the superior one more so than the other: terminated on each side by two sharp mucrones, and posteriorly by a narrow curved mucro not so long as the body or main portion of the shell. Lips everted, the inferior one bordered exteriorly by a raised ridge, which towards the lateral mucrones gradually becomes confluent with the edges of the lips. Length 5 mm., of which the terminal mucro forms about 2. Breadth nearly 3 mm.

Related to *H. inflexa* and *labiata* of D'Orbigny.—It differs chiefly in being more inflated, especially the inferior valve, and in being narrower behind the lateral mucrones—a character, it would seem, of some importance in this genus.

The length of the terminal portion of the shell seems to be relied upon as the distinction between *Diacria* and the more typical members of the genus *Hyalæa*. The present species belongs to *Diacria* on account of this character.

Scalaria Leroyi, Guppy, Pl. XVI. Fig. 10, and Pl. XVIII. Fig. 2.

Proceedings of the Scientific Association of Trinidad, 1867, p. 168.

Turreted, cylindrical, many-whorled, cancellated by numerous transverse and spiral costellæ, except on the base, which is spirally striate only. Aperture suboval. Pillar-lip somewhat everted, forming a callus on the columella. Outer lip simple, sharp, a little dilated anteriorly. Whorls regularly rounded, suture deeply sunk.

My original description of this shell was drawn up from an examination of the specimens found in Trinidad, which are so much altered by fossilization that the character of the surface is not determinable. The examples from Jamaica are in good preservation, though they are not so large as those found in Trinidad, one of which is more than six inches long. Some of the specimens from Jamaica exhibit a variation in the character of the surface, which might induce a belief that there are two species. I do not, however, take that view. One beautiful example has the transverse costellæ larger and more distant than the spiral ones, the latter being threadlike and rising upon the former. In this example the spiral striation of the base is also more marked. *Sc. Leroyi* may be compared with *Sc. magnifica*, Sow.; but there are points of resemblance between it and *Sc. decussata*, *ravicosta*, and *lineata*. None of the recent West Indian species bear any resemblance to the fossil except in that general shape which is common to nearly all the members of the genus. On the whole, however, the nearest ally of the Jamaican fossil may perhaps be found in *Sc. tenuistriata*, Orb. (Bahia Blanca).

Bingicula tridentata, n. sp.

Ovate-conic, moderately thick, smooth, shining. Spire conic. Whorls about 4. Aperture suboval: columella thickened and bearing two strong spiral plaits, the callus continued backward, and carrying a stout tooth on the body-whorl; the latter separated by a deep notch or canal from the thickened and somewhat everted outer lip. Length nearly 2 mm., breadth about 1.

Distinguished from *B. semistriata*, Orb. (Cuba Shells, vol. ii. p. 103, pl. xxi. f. 17-18), by a wider mouth and less thickened outer lip. *B. tridentata* does not exhibit any trace of the striation which marks the anterior portion of *B. semistriata*, which was described by D'Orbigny as a recent shell from Jamaica.

Naticina regia, n. sp. Pl. XVII. Fig. 6.

Oval oblong, spirally striated by fine equidistant grooves, which are crossed by a few rather irregular lines of growth. Whorls about 5, the last very large. Spire short, acuminate. Aperture semioval, rather narrowed above. Umbilicus round, very partially hidden by the everted columella callus. Outer lip sharp, indistinctly dentate. Length 15 mm., breadth nearly 10.

Closely akin to *N. Lamarchiana*, from which it is distinguished by its narrower mouth. It is almost as near to *N. papilla* (Africa), but it is less elongate in its proportions.

Bulla Vendryesiana, n. sp. Pl. XVI. Fig. 6.

Rimate, rather cylindrical-ovate, solid, smoth. Spire deeply sunk. Aperture longer than the shell, dilated anteriorly. Inner lip covered with a callus which is everted over the narrow umbilicus, and extends backward to the canal separating the body-whorl from the sharp outer lip. Length about 15, breadth about 9 mm.

Allied to *B. striata*, Brug., particularly to that form called *B. maculosa*, Mart. The surface of the fossil is not well preserved, and does not admit of an exact description of its characters. *B. Vendryesiana* is rather more cylindrical in shape than *B. striata*, and from *B. maculosa*, to which it is nearer in figure, it is distinguished by its greater solidity and its thicker and more everted columella callus.

Tornatina coixlacryma, Guppy.

GEOLOGICAL MAGAZINE, 1867, Vol. IV. p. 500.

Tornatella textilis, n. sp. Pl. XVII. Fig. 4.

Oval-oblong, solid, a little ventricose, closely cancellated by numerous spiral riblets and finer longitudinal threads most distinct in the spiral grooves. Spire short, conic. Whorls about 7. Aperture elongate, narrow, dilated anteriorly into a canal. Columella twisted, bearing a single stout fold. Outer lip sharp, finely dentated by the spiral riblets. Length 17, breadth 9 mm.

In shape this shell approaches *T. fasciata*. It is of more solid structure, its spire is somewhat shorter, and it is at once distinguished by its cancellated surface.

Cylichna ovum-lacerti, Pl. XVIII. Fig. 22.

Shell small, cylindrical-subovate, minutely striate transversely; spire small, sunken; aperture as long as the shell, dilated anteriorly; outer lip straight, blunt; columella callus with a strong tortuous fold.

Lower Miocene, Trinidad.

Turbonilla turris, Orb., Pl. XVIII. Fig. 15.

Chemnitzia turris, Orb., Moll. de Cuba, pl. xvi. f. 10–24.

Other forms of this species are distinguished specifically by D'Orbigny as *C. pulchella*, *C. ornata*, and *C. modesta*.

These and other varieties are common in the Matura Beds, Trinidad.

Aclis helecteroides, Pl. XVIII. Fig. 11.

Shell turreted, cylindric, many-whorled, shining, whorls slowly increasing, impressed with a deep groove below the suture, which is equally deep, forming a spiral thread; aperture sub-circular, columella slightly reflexed, peristome simple.

Pliocene, Trinidad. It resembles a *Proto*, but the columella prevents its reference to that genus. I refer it to the genus *Aclis* provisionally only, as I think it will be found to be the type of an undescribed genus.

Leiostraca clavata, Pl. XVIII. Fig. 16.

Shell rather club-shaped, whorls smooth, flattened, the last forming more than $\frac{1}{2}$; spire acuminate, suture linear, scarcely impressed; aperture suboval, elongate, narrow above, dilated in front; peristome simple, columella somewhat reflected and thickened.

Pliocene, Trinidad. Allied to *L. acuta*

Turritella planigrata, Pl. XVIII. Fig. 5.

Conic-cylindric, striate by fine spiral lines, whorls very slightly convex, the later ones nearly flat; aperture sub-quadrangle.

Miocene, Trinidad. A very distinct species, remarkable for its almost entire want of ornamentation, and the flatness of its whorls.

Vermetus trilineatus, Pl. XVIII. Fig. 12.

Conic-cylindric, turreted, spire pointed, whorls flat, bearing three narrow spiral keels; lower whorls irregular; suture distinct, linear shallow.

Pliocene, Trinidad. The young shell is not to be distinguished from a small *Turritella*, but the subsequent growth supplies the Vermetiform character.

Triforis guttata, Pl. XVIII. Fig. 27.

Reversed, cylindrical; whorls about eight, zoned with three spiral lines of small obtuse points which are connected spirally and longitudinally by threads; suture impressed; base with three or four strong striations; aperture produced into a canal; peristome produced, inner margin with a narrow defined callus.

Pliocene, Trinidad. Allied to *T. ventricosus*, Gmel.

Solarium semidecussatum, Pl. XVIII. Fig. 14.

Small, orbicular depressed, strongly decussate on the upper surface, nearly smooth on the lower surface; umbilicus deep, its margins crenate and spirally striate.

Pliocene, Trinidad. It is with some doubt that I refer this species to the genus *Solarium*.

Cancellaria scalatella, n. sp., Pl. XVII. Fig. 4.

Turreted, umbilicate, spirally striate by numerous close spiral threads more elevated on the stout rounded longitudinal variciform ridges, of which there are six or seven on a whorl. Suture very deeply sunk. Whorls about seven, slightly rounded, angulate and crowned above by the ridges. Aperture almost triangular, rounded above, angular and formed into an obsolete canal anteriorly. Outer lip sharp, grooved within. Inner lip continuous, thin, sharp, slightly reflected and bearing two folds. Base angulate, perforated by a small round umbilicus.

Related to *C. varicosa*, Brocchi (Miocene, Piedmont); but smaller, and of somewhat stouter figure. The spiral striæ are coarser, and the peristome is finely grooved instead of being coarsely dentate only. In *C. varicosa* the spiral striæ are crossed by very fine longitudinal ones, which do not exist in *C. scalatella*. The most striking difference, however, is that the whorls are rounder, and the

suture much more deeply sunk in *C. scalatella*, whilst the longitudinal ridges project upon the angle of the whorls so as to give a coronate appearance.

The three *Cancellaria* hitherto described from the Jamaican Miocene are all akin to European fossils of the same date; but two of them belong to the type of the recent *C. reticulata*. The present is of more decidedly Miocene aspect than either of the three previously described.

Ovulum immunitum, n. sp., Pl. XVI. Fig. 7.

Fusiform-elongate, pointed at both extremities. Outer lip thickened, extending in a nearly regular slight curve from the posterior to the anterior canal; slightly dilated anteriorly. Inner lip with two strong folds at the anterior end. Aperture as long as the shell; narrow posteriorly, growing wider gradually until near the middle of the whorl, then increasing in width by the expansion of the outer lip and the recession of the whorl to form the slightly twisted pillar-lip. Length about 20, breadth about seven mm.

Allied to *Ov. Leathesi*, Wood, of the English Crag. It is nearly of the same size, but is more slender in its proportions, and in some particulars is more close to *Ov. spelta*, including under that term both the fossil and recent species so called.

Conus recognitus, Guppy.

C. solidus, Sowerby, Journ. Geol. Soc., vol. vi. p. 45.

C. recognitus, Guppy, Proc. Scient. Assoc. 1867, p. 171.

The name *solidus* having been used for another Cone, I proposed in 1867 the name of *recognitus* for this species.

Conus consobrinus, Sow., Pl. XVII. Fig. 4.

Sowerby, Journ. Geol. Soc., vol. vi. p. 45.

I have referred this shell to Sowerby's species; but if my determination be correct, Sowerby's description is in need of amendment. The zones, or rather spiral ribs, can scarcely be called granose, although they exhibit a tendency to become so towards the completion of the last whorl, which is usually devoid of the tubercular crowning of the previous whorls.

This species was hitherto only known from Haiti, but it is now added to the Jamaican list.

Conus prototypus, Pl. XVIII. Fig. 1, and Pl. XVII. Fig. 9.

Somewhat pyriform, finely striate anteriorly, becoming quite smooth on the angle of the whorls, which bear a rather indistinct keel; spire mucronate, rather elevated; aperture somewhat widened towards the anterior canal.

Miocene, Trinidad. A cone which departs very considerably from the usual type in its swelling outlines and the consequent direction and shape of the aperture. It is more of the shape of *C. bulbosus* than of any other species I know. It is, however, probably a young specimen.

Mangelia micropleura, Pl. XVIII. Fig. 6.

Subfusiform, longitudinally ribbed, the ribs crossed by numerous striae, of which a prominent one forms an angle on the upper part of the whorls; last whorl longer than the spire; aperture rather narrow, lanceolate, with a sinus on the posterior part of the thickened peristome.

Pliocene, Trinidad. Allied to *M. pulchella*. The ribs vary considerably as to size and distance apart.

Purpura miocenica, n. sp., Pl. XVI. f. 9.

Subpyriform, rather ventricose above, rimate, narrowed and produced anteriorly, adorned with longitudinal ribs (about 10 to the whorl), which are crossed by coarse rugose high narrow spiral ridges or threads. Whorls about six, apex acuminate. Pillar-lip smooth, reflected over the shallow umbilical fissure. Canal produced. Outer lip sharply dentate by the spiral ridges. Length about 22, breadth about 15 mm.

The outer layer of the shell is usually removed, and where this is the case, each spiral rib appears to be double; but when the outer surface is preserved, the somewhat foliated or echinated rugosities of these ribs are very obvious.

This is a *Coralliophila*, and is related to the *P. galea* (Chemn.) of D'Orbigny, of which the name ought probably to be *P. plicata*, the appellation *galea* being the rightful property of a closely allied East Indian shell. Another form with which the Jamaican fossil may be compared is *P. squamulosa*, Reeve.

Fasciolaria textilis, n. sp., Pl. XVI. Fig. 5.

Elongate, fusiform, closely cancellated by numerous spiral ridges from one to two mm. distant, between which are (especially anteriorly) one, two, or three finer threadlike ribs; and by numerous closer and smaller longitudinal lines. Whorls six, the first two of which are smooth, the apex deciduous and usually wanting, the last more than two-thirds of the shell, rather ventricose above the middle, produced and rather attenuated anteriorly; bearing on the upper half 5-7 elongate rounded tubercular prominences. Columella margin with three strong tooth-like plaits. Interior of peristome smooth. Length nearly 70 mm., breadth 30.

The cancellation gives to the surface an appearance like that of coarse cloth or bagging. This species should be compared with the *F. intermedia* of Sowerby, from the Haitian Miocene. It bears a resemblance to *F. filamentosa*, but is shorter, stouter, and less angular in all its features except only the tubercles, which are disposed in similar fashion, but are perhaps somewhat larger and more elongate. It is very different from *F. Tarbelliana*, Grat., which occurs at Cumana in Venezuela, as well as in Chili and Europe. *F. textilis* exhibits the close alliance of the genus to *Turbinellus*.

Phos erectus, n. sp., Pl. XVI. Fig. 1.

Solid, turreted, conic-cylindric, finely striated longitudinally, and adorned with stout longitudinal variciform ridges, which are highest

on the angle of the whorls, become obsolete at the shallow suture, and are twisted at the base: coarse spiral threads cross the longitudinal grooves and ridges, rising on the latter into low scarcely noticeable tubercles. Whorls about nine, increasing very gradually, slightly angulated, the last forming more than one-half the length of the shell. Aperture rather narrow. Columella twisted, bearing one spiral plait. Outer lip simple, having 12–15 entering grooves, and furnished with a small sinus near the anterior canal; joined posteriorly with the body-whorl by a callus. Length about 21, breadth about 10 mm.

Columbella peculiaris, Pl. XVIII. Fig. 20.

Cylindric-suboval, often a little distorted; whorls six, slowly increasing, the last forming about $\frac{1}{2}$; spire obtuse; suture somewhat irregular or dentate; aperture small, pointed above, peristome simple, columella simple, truncate.

Pliocene, Trinidad. Perhaps allied to *C. clausiliformis*, Kien., but of shorter and more ventricose figure.

Planaxis crassilabrum, n. sp., Pl. XVIII. Fig. 13.

Conic-oblong, somewhat flattened, smooth; spire conic; outer lip dentate, much thickened and somewhat everted; columella flattened, boldly truncate, spirally striate; anterior canal short, open; posterior canal narrow, separated from the body-whorl by one or two stout teeth.

Pliocene, Trinidad.

(To be concluded in our next Number.)

NOTICES OF MEMOIRS.

LA RECHERCHE GÉOLOGIQUE DE LA SUÈDE.—“Description de la formation Carbonifère de la Scanie.” By EDVARD ERDMANN. With a geological map and 4 plates of plans and sections. 1874.

THIS Memoir is published in a bilingual form, the French translation, which precedes the Swedish text, being somewhat abridged. This Coal-bearing formation in Scanie is said to be of Liassic age, the true “Carboniferous” being entirely absent. The other rocks of the district are, crystalline rocks, gneiss, etc.; the Cambrian formation, to which are referred certain quartzites; Lower Silurian, which include alum-shales, Orthoceratite limestone, and argillaceous schists. The Upper Silurian is also represented by limestones and schists, the former rich in fossils, but the schists so like those of the Lower division that they are represented by one colour on the map. The next following beds are Red Sandstones and shales, probably of Triassic age, but no unconformability to the Upper Silurian has been detected as yet; in fact some of these Red Sandstones were referred by Murchison and Angelin to the Upper Silurian; no fossils have been found in them. On these red beds follow directly the Coal-bearing (Jurassic) strata. But probably the Hör sandstone should be intercalated here, although not found in direct relation to any of the former stratified beds, for, from the