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Quod si cui mortalium cordi et curæ sit non tantum inventis hæerere, atque iis uti, sed ad ulteriora penetrare; atque non disputando adversarium, sed opere naturam vincere; denique non belle et probabiliter opinari, sed certe et ostensive scire; tales, tanquam veri scientiarum filii, nobis (si videbitur) se adjungant.  
—*Novum Organum, Præfatio.*

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55. *On the MIOCENE FOSSILS of HAITI.* By R. J. LECHMERE GUPPY, Esq., F.L.S., F.G.S., C.M.Z.S. President of the Scientific Association of Trinidad. (Read May 10, 1876.)

[PLATES XXVIII. & XXIX.]

A VERY important memoir "On the Topography and Geology of Santo Domingo" has recently been published by Professor Gabb\*. Whatever tends to elucidate the geology of the island of Haiti must of course contribute to our knowledge of West-Indian and American geology generally, and may also throw further light upon some of the problems connected therewith which have not as yet been solved.

Santo Domingo is a republic occupying two thirds of the Island of Haiti. A very large portion of the territory comprised within its boundaries has been geologically surveyed and mapped out by Prof. Gabb and his assistants. The formations examined by them are classified as Postpliocene, Miocene, and Cretaceous. Eruptive rocks are also developed to a large extent.

It is not my intention to speak of the geological part of Prof. Gabb's labours. That could only be done usefully by those acquainted with the country and conversant with its structure. My present business is with the palaeontological portion of the work.

The Geological Society possesses the first regular collection of fossil Tertiary shells and corals made in Haiti, and, indeed, I might almost say, in the West Indies. This collection contains the types of the species described by Sowerby for Mr. Carrick Moore, and by Prof. Duncan. I have from time to time, when treating of the West-Indian Tertiary rocks and fossils, alluded to the fact that several of the species contained in that collection were unnamed.

Most of those species have now been described by Prof. Gabb; but it is to be regretted that his work is not accompanied by figures, so that our determinations may sometimes be open to doubts which the aid of pictorial illustration would enable us to dispel.

In the Proceedings of the Scientific Association of Trinidad for December 1873, I described several new fossils from Jamaica; and deeming it desirable that those fossils should be more widely known than they could be by means of that publication, whose circulation is very limited, I republished the descriptions and figures in the 'Geological Magazine' for September and October 1874, together with a revised list of the organic remains (exclusive of the corals and other fossils) which had been found in the Tertiary deposits of the Caribbean region. This list was a revision of one previously published by me in the Proceedings of the Scientific Association of Trinidad for 1867. The first knowledge I had of Prof. Gabb's work

\* Trans. Amer. Phil. Soc. vol. xv. p. 49, with a geological map of Santo Domingo. See also, for the new genera described, Proc. Acad. Nat. Sci. Phil. 1872, p. 270.

was from the January (1875) number of the 'Journal de Conchyliologie,' which, however, I did not receive until some time after the date of its publication. In August last Prof. Gabb did me the kindness to send me a copy of his publications relating to the geology and palæontology of Haiti. I deemed the opportunity a favourable one for reexamining the Haitian fossil mollusca, which had been untouched since 1853. The present communication, which embodies the results of my reexamination, is confined for the most part to such species as I have identified in the collection of the Geological Society, or have noticed in other collections of West-Indian Tertiary fossils.

We have not escaped the tendency, almost inevitable in the case of little-known forms, to describe mere varieties, some more or less permanent, some merely individual, under distinct specific names. Prof. Gabb has done good service by uniting together some of these artificially separated forms; and in this labour he has had the advantage of large suites of specimens collected by himself in Haiti. While contributing my quota towards a reduction of our superfluous nomenclature, I may observe that it is not always a disadvantage in the beginning (particularly when the descriptions are accompanied by good figures) to distinguish the various forms which are mistaken for distinct species. Owing apparently to the great exuberance of Molluscan life in the West-Indian Miocene, much variation occurred, especially in certain genera.

In all the corrections I have ventured on in respect of Prof. Gabb's determinations, I have not acted in any spirit of derogation of his work, which I consider very valuable; and I could congratulate myself if my own had been at all times as well done.

One of the results stated by Mr. Carrick Moore has been brought out more strongly by Prof. Gabb's examination of the Haitian fossils. It is the alliance of the West-Indian Miocene fauna to that of the west coast of South America; and I think now that the conviction can hardly be resisted that during some portion of the Miocene period there was a free communication between the Pacific and the Atlantic. But other alliances point to the west coast of Africa; and there remain other alliances still more close with the Eastern and Indian Seas.

In a letter to me, dated 18th September, 1871, the late Prof. William Stimpson informed me that in the deep-sea explorations off Florida he had discovered shells either identical with or very closely allied to some species of the West-Indian Miocene. Among them he cited *Conus planilica* vs, *Pleurotoma Barretti* (= *Pl. haitensis*), *Phos elegans*, and *Corbula vinica*.

For the sake of conciseness I have, in the following remarks, used the abbreviation G. J. for the Quarterly Journal of the Geological Society.

1. DENTALIUM DISSIMILE, Guppy, G. J. vol. xxii. p. 292, pl. xvii. fig. 4.

I am inclined to believe that Gabb's *D. pouderosum* is a form of

71. *PLEUROTOMA VENUSTA*, Sow. G. J. vol. vi. p. 50, pl. x. f. 7.

My *P. jamaicensis* may possibly be referred to this species as a small and marked variety. The living analogue of this species appears to be *P. gibbosa*, Chemn.

72. *PLEUROTOMA CONSORS*, Sow. G. J. vol. vi. p. 50. (Pl. XXVIII. fig. 7.)

I cannot undertake to say that this is identical with *P. militaris*, Hinds, though Gabb considers it so. The likeness was remarked by Sowerby.

73. *PLEUROTOMA SQUAMOSA*, Gabb, Trans. Amer. Phil. Soc. vol. xv. p. 208. (Pl. XXIX. fig. 7.)

There is one example of this species in the Geological Society's collection. The sculpture is very remarkable. Several other forms of *Pleurotoma* are named by Gabb; but I have seen none which may not be referred to one or other of the above five species, which are well marked and decidedly distinct.

74. *CLAVATULA LABIATA*, Gabb, Trans. Amer. Phil. Soc. vol. xv. p. 209. (Pl. XXVIII. fig. 3.)

Near to *C. imperialis*, Lam. West Africa.

75. *CONUS RECOGNITUS*, Guppy.

*C. solidus*, Sow. G. J. vol. vi. p. 45; Guppy, G. J. vol. xxii. pl. xvi. fig. 1.

Gabb identifies this with *C. pyriformis*, Reeve. The *C. solidus* of Sowerby (Thes. Conch. 580, = *C. retifer*, Menke) is a different species, very unlike the Haitian shell.

76. *CONUS CONSERVATUS*, Sow. G. J. vol. vi. p. 45; Guppy, Geol. Mag. 1874, pl. xvii. f. 3.

*C. granozonatus*, Guppy, G. J. vol. xxii. p. 287, pl. xvi. f. 5.

Prof. Gabb has so conscientiously worked out the Haitian Cones that I accept this rectification, which otherwise would have appeared to me difficult. The figure given by me in the Geological Magazine is fairly representative of the usual form.

77. *CONUS CATENATUS*, Sow. G. J. vol. vi. p. 45, pl. ix. f. 2.

*C. interstinctus*, Guppy, G. J. vol. xxii. p. 288, pl. xvi. f. 3.

*C. stenostoma*, Sow. G. J. vol. vi. p. 44; Guppy, G. J. vol. xxii. p. 287, pl. xvi. f. 2.

Gabb records *C. stenostoma* as distinct from *C. catenatus*; but I find great difficulty, on comparison of many specimens, in drawing the line of demarcation.

78. *CONUS GRACILISSIMUS*, Guppy, Geol. Journ. vol. xxii. p. 288, pl. xvi. f. 4.

Gabb refers this to *C. Orbignyi*, Audouin (*C. planicostatus*, Sow.) Q. J. G. S. No. 128.

It bears much likeness to a shell recently described by Sowerby as *C. gracilis* (Zool. Proc. 1875, p. 125, pl. xxiv. f. 6).

79. *CONUS MARGINATUS*, Sow. G. J. vol. vi. p. 41. (Pl. XXIX. fig. 5.)

I believe the specimens from Cumana, which I formerly attributed to *C. haitiensis*, really belong to *C. marginatus*—a mistake due to want of figures.

80. *CONUS PLANILIRATUS*, Sow. G. J. vol. vi. p. 44.

*C. planiliratus*, Guppy, G. J. vol. xxii. p. 287, pl. xvi. f. 7.

Gabb identifies this with *C. Stearnsi*, Conrad, Florida.

81. *CONUS HAITIENSIS*, Sow. G. J. vol. vi. p. 44.

*C. symmetricus*, Sow. l. c. p. 44, pl. ix. f. 1.

*C. domingensis*, Sow. l. c. p. 45.

I adopt the above synonymy from Prof. Gabb. The shell described by me as *C. prototypus* may possibly be the same as *C. strombiformis*, Gabb.

Of the other species of *Conus* enumerated by Prof. Gabb I have no knowledge. All the West-Indian Miocene forms I have seen may be assigned to one or other of the species named above—though, owing to the great range of variation, some difficulty is sure to be felt until the student has obtained a closer acquaintance with these fossils.

82. *MITRA HENEKENI*, Sow. G. J. vol. vi. p. 46, pl. ix. f. 5.

I have recognized no other Mitre than this in the West-Indian Miocene; and I should be inclined to place under it most, if not all, of the forms described by Gabb under different specific names—the only exception being *M. tortuosa*, which Prof. Gabb states to belong to the group *Costellaria*, Swains., and to be akin to *M. semifasciata*, Lam. The *M. varicosa* of Sowerby has not been identified either by Prof. Gabb or myself. It is possible that *M. titan*, Gabb, may be a valid species.

83. *VOLUTA PULCHELLA*, Sow. G. J. vol. vi. p. 46, pl. 9. f. 4.

Gabb is right in considering *V. soror*, Sow., to belong to this species. It has no characters by which even to separate it as a variety.

I have not met with *Scapha striata*, Gabb.

84. *MARGINELLA CONIFORMIS*, Sow. G. J. vol. vi. p. 45; Guppy, G. J. vol. xxii. p. 288, pl. xvii. f. 2.

85. *MARGINELLA SOWERBYI*, Gabb, Trans. Amer. Phil. Soc. vol. xv. p. 221. (Pl. XXVIII. fig. 1.)

86. *CYPRÆA HENEKENI*, Sow. G. J. vol. vi. p. 45, pl. ix. fig. 3.

87. *CYPRÆA GABBIANA*, n. sp. (Plate XXIX. fig. 10.)

The cowry for which I propose the above name has hitherto been considered by me to be *C. pustulata*, and has been identified by