REPORT ON LAND AND FRESH WATER SHELLS COLLECTED IN THE BAHAMAS IN 1904, BY MR. OWEN BRYANT AND OTHERS.[1]

By WILLIAM HEALEY DALL

The Bahama islands are particularly interesting to American naturalists, as affording the development of tropical fauna nearest to us; but especially as containing the most valuable evidences of evolution in living animals within a geologically short period of time. There is no doubt that the entire archipelago has been below the surface of the sea not earlier than the end of the Pliocene, and that the present land and fresh water fauna has developed from ancestors which have reached the islands since that time, from adjacent lands. Among the various kinds of airbreathing animals none are more suitable for a study of evolutionary processes in a very uniform and of late very stable environment, than the Pulmonate gastropods. Slow to migrate; profuse in reproduction; affected by a relatively small number of environmental factors; preserving their variable characters chiefly in their shells, which are easily collected and require the assistance of no taxidermist to preserve from decay; lending themselves readily to fossilization, easily observed and maintained in a living state—they form ideal objects for the study of the questions involved.

Only recently has the effect of isolation on islands shut in by marine barriers been appreciated in its relations to developmental problems, and of all localities accessible to us, where these problems can be studied with ease and without exposure to pestilential conditions none compares with the vast group of rocks and islands known as the Bahamas.

So far, little advantage has been taken of these opportunities, and the work which has been done by Henry Bryant, J. J. Brown, Governor Rawson, Weinland, the U. S. Fish Commission, the expedition

[1] Mr. Bryant desires me to state that this report is the fifth of a series based on collections made by G. M. Allen, T. Barber, and Owen Bryant during part of the summer of 1904. In the present case a representative series of Mr. Bryant's shells is contained in the collection of the National Museum, as a donation from the collector. The Bahama localities in the text are taken from Mr. Bryant's labels, except where otherwise indicated.

of the Baltimore Geographic Society, and now by Mr. Bryant, has been chiefly hurried collecting at as many localities as possible, rather than the patient study of conditions and results, exhaustively applied to any single locality.

However, in any event, much must be left to the future, and every addition to our knowledge is so much gained; and fortunately for science, if not for the easy-going inhabitants of the Bahamas, the spread of agricultural operations and the introduction of domesticated animals progresses so slowly that the natural conditions are not, as in Hawaii, being radically changed before they can be thoroughly studied.

Though somewhat hampered by illness Mr. Bryant collected energetically and in certain localities where time permitted very thoroughly. His journey included opportunities for observation in the vicinity of the south bight of Andros Island especially at Mangrove Cay; at and about Nassau, New Providence; at numerous points on the east and north shores of the Abaco group, and a few points on their south and west shores and at Riding Point, Grand Bahama, opposite; also some of the cays to the westward of Little Abaco.

In a general way each group of islets, or each island inhabited by land shells has its characteristic forms of pulmonate mollusks. Some few forms are widely distributed, but others, especially *Cepolis* and *Cerion*, are for the most part very local, with a few widely distributed species. It is therefore very desirable that the fauna of each island should be thoroughly elucidated. Of the species collected by Mr. Bryant 35 were previously known from the Bahamas, 15 were known to science but not definitely reported from the Bahamas, 4 new species or varieties have been added to the fauna by Mr. Bryant and 14 have been contributed from inedited material in the National Museum, making 18 new forms first described in this report, which covers, in all, 66 species. The total now known from the Bahamas is 174 species and marked varieties.

List of the Species Collected by Mr. Bryant, with Descriptions of Several New Forms.

Oleacina solidula Pfeiffer.

Mangrove Cay, south bight of Andros; Nassau, on the Grantstown road and near Johnson's place; Little Abaco near Marsh Harbor and Nield's, and on the south side at Mathews Point.

The species appears to be common and quite uniform in adult characters.

Pleurodonte provisoria Pfeiffer.

Nassau, near Fort Charlotte, and Mr. Johnson's place; the young burrowing in loose earth under a large banyan tree; at Little Abaco, near Nield's; rather common.

Cepolis varians Menke.

Andros; Nassau; the Abaco group; Elbow Cay, Great Abaco.

Common and very variable, but with many local races. Those at Elbow Cay were all very light colored, etc.

Cepolis troscheli Pfeiffer.

A few specimens were obtained at Nassau, near Fort Charlotte and the Grantstown road.

Cepolis exumana Dall.

Three miles west of Fort Charlotte, Nassau. The species was originally described from Exuma Island.

Cepolis duclosiana Férussac.

Common at Nassau, and quite uniform in its characters.

Cepolis smirna new species. Pl. LIX, figs. 3, 4, 5.

Shell polished, smooth, except for delicate lines of growth, of about four and a-half whorls, the spire moderately elevated, the whorls neatly rounded, the base flattish with a small but deep umbilicus; aperture transversely oval, the lower part of the peristome reflected, white, with a low basal lamina behind it; last whorl at the aperture markedly descending; color of the fresh shell, pale fleshy brown with a rather wide white peripheral band bounded on each side by a dark reddish brown band, the basal one wider than the upper one, which last on the spire runs just above the suture. Major diameter 17.0, minor diameter 14.0, height of shell 9.0 mm.

Habitat. Riding Point, Grand Bahama Island, where many dead (but only one living specimen) were found.

The shell has much the same form as *C. duclosiana*, has a similar basal lamina and umbilicus; but is larger, relatively more elevated, and of a totally different color. It differs from *abacoensis*, which has a similar color pattern, by having a smooth and polished surface.

Cepolis gregoriana Dall.

Riding Point, Grand Bahama; Stranger Cay, crawling on lily stalks, and at numerous localities on Great and Little Abaco.

This form (originally described from Eleuthera) is one of the group of *C. abacoensis*, from which it differs in color and in having no dark brown band below the peripheral pale one, and in being less sharply sculptured. The general coloration of the shell is a somewhat livid purplish brown, lighter or darker; with a narrow pale peripheral band, which is occasionally bounded above by a narrow dark line but perhaps more often merely separates the brown

areas of the spire and base. The basal lamina is quite feeble and low, and the sculpture variable.

Cepolis androsi n. sp. Pl. LIX, figs. 2, 7, 8.

Shell small, sharply sculptured with elegantly spaced threads in harmony with the incremental lines, with four moderately convex whorls, a convex base with the lower or pillar lip reflected over and almost completely closing a very narrow umbilicus; the rest of the peristome hardly reflected; basal lamina when fully adult strong and high, parallel with the basal lip; color sometimes uniformly purple brown, or with a narrow peripheral white band under a darker brown line, or with a dark peripheral line with a white one above and below it, or with the brown of the base broken up into four or five spiral bands separated by pale interspaces. Major diameter 13.0, minor diameter 11.0, height 7.5 mm.

Mangrove and Galden Cays in the south bight of Andros Island.

Though a smaller shell this has a more solid basal lamina than *gregoriana* or *abacoensis*, a much smaller and nearly closed umbilicus and less reflected peristome, but it clearly belongs to the same group of species.

Thysanophora vortex Pfeiffer.

Mangrove Cay, Andros; Nassau near Fort Charlotte and in the entrance to the cave at Gladstone's place; and near Johnson's place; and at Mathews Point on the south side of Abaco.

This species has the habit of plastering the outside of its shell with dirt (perhaps its own fæces, as in some species of *Succinea*) which is placed in regularly spaced nodules as well as over the general surface, giving the shell a stellate aspect when viewed from above. Beneath this coating the shell is white or translucent, and when cleaned would hardly be recognized as identical with those retaining their coat of dirt which is doubtless protective.

Thysanophora saxicola Pfeiffer.

Nassau, not uncommon.

This has not previously been reported from the Bahamas though known from Cuba, Jamaica, etc. It is the *Helix mauriniana* of Orbigny.

Thysanophora dioscoricola C. B. Adams.

Nassau, near Fort Charlotte and on the Grantstown road; rare.

This is another addition to the Bahaman fauna, though previously known from Jamaica, Cuba, Florida, etc.

Polygyra microdonta Deshayes.

Common at Nassau and in the Abaco group.

This race of *P. cereolus* Mühlfeldt, appears to be spread com-

pletely over the Bahamas having been reported from nearly all the localities where collections have been made. Riding Point, Grand Bahama and Moraine Cay are localities not previously noted.

Microceramus gossei Pfr. var. *providentia* Pilsbry.

Mangrove Cay, south bight of Andros; Nassau; and Little Abaco, near Nield's place.

The allied *M. swiftii* does not seem to turn up from the western Bahamas.

Bulimulus sepulchralis Poey.

Common at Nassau, where it may very likely have been introduced from Cuba. It affects the neighborhood of drains, etc.

Bulimulus bahamensis Pfeiffer.

Mangrove Cay, Andros; and Nassau on the Grantstown road; widely spread through the Bahamas but seemingly not common anywhere.

Urocoptis bahamensis Pfr., var. *providentia* Pilsbry.

Mangrove Cay, Andros; Nassau, near Johnson's place; and on rocks near the entrance to the cave on the Gladstone place.

Cerion ritchiei Maynard.

Mangrove Cay, Andros.

Two very poor specimens which appeared to be this species were taken with hermit crabs.

Cerion glans Küster, var. *coryi,* mut. *agava* Maynard.

From sisal growth near Fort Charlotte, Nassau.

Cerion glans Küster, var. *griseum* Maynard.

Mangrove Cay, Andros Island.

Cerion glans Küster, var. *bimarginatum* Maynard.

Galden and Mangrove Cays near the south bight of Andros, a few defective specimens.

Cerion glans obesum Dall, nov. Pl. LVIII, fig. 15.

This form was obtained from Long Cay, north bight of Andros by the late Prof. John J. Northrop; and from Mangrove Cay, south bight, by Mr. Owen Bryant. While varying somewhat in height it preserves very uniformly its stoutness and irregular sparse ribbing. It has two and a half smooth pale nuclear and nine subsequent whorls of a bluish or brownish white color, sometimes with a purplish undertone, or faintly mottled with irregular blotches of pale brown, the aperture waxen white and deep in the throat warm yellow-brown. The surface is polished, free from spiral striæ, obliquely ribbed with (on the penult whorl 22–28) irregular sharp narrow ribs separated by wider interspaces. The body is subcylindric, the apex short and subacute: the umbilicus minutely perforate, the triangle between it

and the reflected peristome rather large. The peristome is rounded and well reflected, the parietal lamina strong, that on the pillar feeble or hardly perceptible.

	Height of Shell.	Aperture	Max. Diameter.
Long Cay	29.0	10.0	15 mm.
" "	35.5	11.0	14.5 "
Mangrove Cay	33.5	11.0	14.0 "

The shell is near *C. glans regulum* Maynard, but is shorter and stouter, more cylindrical, with coarser, less regular, fewer and more widely spaced ribs.

Only a few specimens were obtained by Mr. Bryant, those of Mr. Northrop were better preserved. U. S. Nat. Mus., No. 120,008.

Cerion (*Strophiops*) *watlingense* new species. Pl. LVIII, fig. 7.

Shell small, plump, attenuated before and behind, yellowish white with occasional brown mottlings chiefly between the whitish ribs; peristome yellowish with a brown flush deep in the throat. There are about two brownish smooth nuclear and eight subsequent ribbed whorls; the ribs are nearly vertical, close set with slightly wider regular interspaces, the ribs are of full strength immediately in front of the suture and over the base of the adult; the apex is attenuated in an even curve, the last whorl is more slender than its predecessor, toward the aperture it rises suddenly so that the posterior angle of the aperture is considerably above the middle of the whorl. There are about 28–30 ribs on the penultimate whorl, and no traces of spiral sculpture. The peristome is simple, moderately thickened and reflected, with a thin callus on the body; the parietal fold is strong and short, the axial fold feeble from in front but within well defined; the umbilicus is closed. The size of the eleven specimens collected is unusually uniform.

Height.	Aperture.	Max. Diameter.
25	9	10 mm.
22	7.5	10 "

are the extreme measurements.

No *Cerion* has yet been noted from Watling Island, a mention of *C. glans* in my "Wild Duck" report having been due to an error. This and the following species are therefore the first positively known to come from that island. Though not found by Mr. Bryant, the existence of several unnamed forms was first realized on making an attempt to identify some of his species. As this seems a suitable place for the descriptions they are included. U. S. Nat. Mus., No. 132,970.

Cerion (*Strophiops*) *inconspicuum* new species. Pl. LVIII, figs. 2, 4.

Shell small, white or pale brownish, bluntly spindle-shaped, with about two smooth nuclear and six or seven subsequent whorls; apex arcuately tapering; last whorl moderately attenuated, and, at its termination, ascending a little above the middle of the whorl; umbilicus showing a small open chink; peristome simple, slightly thickened and reflected; the ribs are narrow, small, low and separated by about equal interspaces, slightly oblique and very regular; there is no spiral sculpture. The nuclear shell has two short parietal, and one similar basal denticle; the adult has the single parietal denticle short, feeble, and pustular, the axial lamina almost obsolete.

A variety *lacunorum*, is larger, heavier, and with the parietal and axial laminæ well developed. The measurements are of extremes:

	Height of Shell	Aperture.	Max Diameter
Type	17.0	5.5	6.5–8.0 mm.
Variety	20.0	6.5	8.5 "
"	17.5	5.7	8.5 "

Watling Island, U. S. Fish Commission; the variety on the shores of the lagoon by Dr. J. J. Brown; U. S. Nat. Mus., No. 127,494. The types No. 37,676.

Cerion (*Strophiops*) *canonicum* new species. Pl. LVIII, fig. 13.

Shell stout, solid, whitish or pale brown, sub-cylindric, short, strongly sparsely ribbed and spirally striated. Nucleus prominent, of two and a half whorls, at first smooth then finely transversely striated; subsequent whorls six or seven, with a tendency to constriction a little in front of the suture; the penultimate whorl has about 20 nearly vertical ribs, the interspaces wider and more or less distinctly spirally striated; last whorl rising to the upper third of the whorl at the aperture which is large, with a thin callus on the body and a simple broadly reflected peristome; the umbilicus closed or nearly so; parietal lamina strong, long, extending three quarters of a whorl, axial lamina feeble. Extremes of measurement:

Height of Shell.	Aperture.	Max Diameter
30.0	11.0	12.0 mm.
27.0	9.0	13.0 "

Gun Cay, Wild Duck expedition. This species was erroneously identified as *C. pannosum* Maynard, which is devoid of spiral sculpture, and comes from south of Cuba. All but one of the specimens obtained were subfossil. U. S. Nat. Mus., No. 127,460.

We now come to a group of three or four species which are apparently related to one another but which have been confounded under the names of valid but different species to which they bear a superficial resemblance.

Cerion (*Strophiops*) *variabile* new species. Pl. LVIII, figs. 1, 6. 14.

Shell varying greatly in size, the typical form handsomely axially irregularly striped with opaque white, dark brown and light yellow brown; with two polished, partly transversely striate nuclear and eight subsequent polished whorls, of which the last is more or less distinctly ribbed, the preceding ones striate transversely or smooth, without spiral sculpture, umbilical chink almost closed. The body of the shell is subcylindric, the last whorl not contracted, sometimes very blunt as if truncate, the apex evenly arcuately domed, the apical portion not swollen. The peristome is simple, rounded, reflected, and the parietal part when fully adult is thick and continuous; the parietal lamina is sharp, and one-third of the whorl long; the axial lamina is well developed only behind the pillar, the latter often seeming destitute of a lamina when examined from in front. The measurements are as follows (U. S. Nat. Mus., No. 120,011):

	Height of Shell.	Aperture.	Max. Diameter.
Type form.....	24–21	7	9.5–10.5 mm.
Var. *saurodon*....	38	13	13 "
Var. *pupilla*.....	15.5–20.0	5.0–6.5	5.5–6.5 "

Cerion variabile var. *saurodon* nov. Pl. LVIII, fig. 14.

Shell much larger and heavier than the type form, of about ten whorls, with two nuclear whorls, the apex rather pointed, the last five whorls regularly enlarging, the last the largest, its latter half and base strongly ribbed, the umbilicus perforate, the parietal lamina feeble. U. S. Nat. Mus., No. 120,011*a*.

Cerion variabile var. *pupilla* nov. Pl. LVIII, fig. 1.

Shell small, thin and delicate, subcylindric, smooth, with two nuclear and six and a half subsequent whorls; umbilicus closed; parietal lamina sharply defined, the axial near the base of the pillar, just visible; the peristome is simple, hardly reflected, the parietal part thin; the anterior part of the pillar markedly excavated. This may prove with more abundant material to be a distinct species. U. S. Nat. Mus., No. 120,011*b*.

This species was at first identified as *C. inflatum* Maynard (Acklin Island), though the specimens were collected by the late Professor Northrop at Red Bay on the northwest end of Andros Island. It differs from *inflatum* by its cylindric or conic, not top-heavy form, the

last whorl usually ribbed, those preceding irregularly striate or smooth; it has one more whorl, the parietal callus is not only continuous but usually thick when fully adult; the parietal lamina relatively sharp and clean cut, the axial one invisible from in front; the umbilicus open instead of closed. The two forms referred to *variabile* as varieties are similarly colored and from the same locality, but represented by only three specimens. Notwithstanding the enormous difference in size it seems more prudent for the present to regard them as forms of one species.

Cerion (*Strophiops*) *brunneum* new species. Pl. LVIII, fig. 9.

Shell of moderate size, solid, strong, opaque, white, richly striped and flecked axially with dark chestnut brown; form subcylindric with a rather pointed apex and slightly attenuated last whorl. Nuclear whorls two and a half, pale brown, partly transversely striate; subsequent whorls about eight, obsoletely ribbed, the ribbing strongest on the base; umbilicus closed; peristome broad, thick, simple, strongly reflected, yellowish white; the parietal part thin, interrupted except in fully adult specimens. The throat is livid brown, the parietal lamina low, about one third of the last whorl in length, the axial lamina feeble.

Height of Shell.	Aperture.	Max. Diameter.
28.5	10.0	10.5 mm.
26.0	8.0	10.0 "

This appears to belong the *crimium* group, but differs from that species by its nearly obsolete ribbing, base not paler than above, the dark brown throat, the thin and usually incomplete parietal callus, and the parietal lamina not prolonged into the older half of the last whorl.

The specimens were obtained at Governor's Harbor, Eleuthera, by Messrs. Bean and Riley in 1903. U. S. Nat. Mus., No. 173,266.

Cerion (*Strophiops*) *plegmatum* new species. Pl. LVIII, fig. 5.

Shell of moderate size, light and thin, subcylindric, with two and a half polished, pale, latterly microscopically reticulate whorls, followed by seven smooth or feebly striated whorls axially striped or clouded with dark or light brown and opaque white. Umbilicus closed, base attenuated, apex rather pointed; peristome thin, simple, yellowish white, broadly reflected, in the adult continuous over the body; parietal laminæ short, compressed, axial lamina low, inconspicuous; the base of the last whorl sometimes strongly axially striated.

Height of Shell.	Aperture.	Max. Diameter.
18.5	6.0	8.0 mm.
22.0	7.0	9.0 "
26.0	8.0	8.0 "

Numerous specimens were collected by Dr. J. J. Brown of Sheboygan, Mich., at Exuma Island. U. S. Nat. Mus., No. 37,674.

This species is much like *brunneum,* from which it differs by its smaller, more delicate, and thinner shell, narrower and much shorter parietal lamina, its thinner and less reflected peristome, and its last whorl rising much less at its termination. From *C. inflatum* of Acklin Island, it differs especially by its striate last whorl, and more evenly fusiform shell not swollen toward the apex. This species was identified as *inflatum* by Mr. Maynard, as stated in Dr. Pilsbry's monograph of the genus, but a careful study of it shows that it cannot be so united.

Cerion (*Strophiops*) *Northropi* new species. Pl. LVIII, fig. 11.

Shell of moderate size, thin, delicate, cylindric, with two pale polished nuclear and nine subsequent whorls; white, with sparse narrow irregular oblique brownish streaks; body cylindric, the apex forming a short dome, last whorl hardly attenuated, with a closed umbilicus, simple, well reflected white peristome and feeble parietal callus; parietal lamina small, short (about 4 mm.), axial lamina sharp but hidden; sculpture of (on the penultimate whorl) about 66 very fine, quite oblique, regular even ribs, with narrower interspaces, uniform over the whole shell.

Height of Shell.	Aperture.	Max. Diameter.
27.0	9.0	10.0 mm.
30.0	10.5	10.0 "

"Bahamas," Greegor (probably one of the westernmost islets near Gun Cay). U. S. Nat. Mus., No. 124,135.

This resembles externally *C. Dalli* Maynard, which has a long parietal lamina, and less closely *C. milleri* Pfr. of the Exuma group. There is no other species at all near to it figured by Dr. Pilsbry in the Manual.

That which most suggests it is perhaps a depauperate variety of *C. agrestinum* Maynard, which is easily distinguished by its more solid character, ovate form, larger aperture and more conspicuous peristome. The specimens were obtained from some one of the small cays on the eastern side of Florida strait, but the donor, Mr. I. Greegor, was unable to find out which islet.

Cerion eximium Maynard.

One specimen found at Nassau.

Cerion oweni new species. Pl. LVIII, figs. 3, 8, 10, 12.

Typical form south side of Little Abaco, opposite Marsh Harbor, and on the opposite shore of Grand Bahama at Riding Point; variety *reticulatum* at the Sugar Loaves, rocks northwest of Elbow Cay, off Great Abaco; variety *incisum* (nearly all dead or subfossil). Stranger Cay, northwest of Little Abaco, and one specimen, apparently the same, at Sweeting's village, Little Harbor, Great Abaco; var. *vermiculum* at Mathews Point, south side of Great Abaco. This member of one of the most difficult groups of *Cerion* has been submitted to Dr. Pilsbry, who regards it as new and forming a parallel series to *C. agrestinum* Maynard, from New Providence. As he has recently monographed the group I have adopted his opinion. The species is named in honor of Mr. Owen Bryant, the collector.

Typical form. Pl. LVIII, fig. 12.—Shell large, slender, ashy white, or white marbled and longitudinally streaked and clouded with nut brown of varied intensity; the apical 2½ whorls subtranslucent, the remaining ten opaque, smooth and somewhat polished, or more or less sculptured by fine oblique wrinkles with subequal interspaces about three to one millimeter on the line of the suture; apex beehive-shaped; remainder of the shell subcylindric, the last whorl rising a little near the aperture, the peristome thickened, somewhat reflected, rounded, simple, waxen white; throat brownish, with a short low parietal and feeble axial lamina or ridge of callus; umbilicus with a deep narrow chink; the sutures are not impressed; the immature shells are trochiform, with a narrow axial perforation, a small sharp lamina on the pillar, usually a short feeble tooth on the roof of the aperture and very rarely a faint trace of a callosity on the basal wall also, but I have noticed this only once or twice; measurements of the mutations of this species show the following as divergencies (U. S. Nat. Mus., No. 179,442):

Surface.	Whorls.	Height.	Max. Diam.	Type Form.
Smooth	12.5	37.0 mm.	12 mm.	"
Smooth	10.5	28.5	11.25	"
Feebly striate	12.5	37.0	12.5	"
Sharply striate	12.0	27.0	10.0	"
Sharply striate	12.0	26.5	8.0	"
Feebly striate	9.5	21.0	8.0	"
Subreticulate	11.0	26.0	10.0	variety a.
Subreticulate	9.5	21.5	10.0	" "
Very sharply striate	12.0	28.0	10.0	variety b.
Very sharply striate	10.0	25.0	12.0	" "
Very sharply striate	11.0	22.5	11.0	" "
Very feebly striate	10.0	19.0	7.5	variety c.
Feebly striate	10.0	19.5	7.0	" "

Variety a (*reticulatum*). Pl. LVIII, fig. 8.—Shell smaller, colors tending to livid or purple below ashy white, which is arranged more or less in narrow spiral lines which cut the white wrinkles at nearly a right angle giving a very marked reticulate effect, the striation notably sharper than in the type form. U. S. Nat. Mus., No. 179,443.

Variety b (*incisum*). Pl. LVIII, fig. 10.—Shells stouter, with still sharper sculpture, the form top-heavy, with the maximum diameter nearer the apex than to the base, a less marked umbilicus; the young with a larger axial perforation and on both the upper and lower walls of the aperture a pair of strong short low laminæ beside one on the pillar, making five in all, in the aperture of a shell with six whorls. U. S. Nat. Mus., No. 179,440.

Variety c (*vermiculum*). Pl. LVIII, fig. 3.—Shells small, nearly smooth, slender, subfusiform, with the color in large subaxial marmorations or nebulæ. U. S. Nat. Mus., No. 179,442.

The range of variation in size, sculpture, and color, as above noted, is very large yet the various forms have nevertheless a general resemblance which points to their common origin. Large numbers of the typical form were obtained.

Dr. Pilsbry remarks of them: "a species not hitherto known, very closely related to *agrestinum* of New Providence, but with a general tendency to be larger, longer, more solid and varying to smooth, which *agrestinum* is not known to do. The umbilical slit is also ordinarily longer in your shells and the parietal lamella smaller. The suture above is also more seam-like. These forms are also related of course to *marmoratum, martensi,* and various other forms all more remote geographically than *agrestinum. C. fordii* is a stouter more coarsely sculptured species."

Pupoides marginatus Say, var. *modicus* Gould.

Nassau, near Fort Charlotte, and Mangrove Cay, Andros; common.

The form of *P. marginatus* found on the islands and on the continent from Chesapeake Bay southward, *near the sea,* is the form named *Pupa modica* by Gould. Inland however, even in Florida it assumes its larger and more solid typical form. In a large series a perfect gradation between the two may be established.

Bifidaria servilis Gould.

Mangrove Cay, Andros and commonly at Nassau near Fort Charlotte and the Grantstown road.

Subulina octona Bruguière.

Nassau, at various localities, common.

Opeas octonoides C. B. Adams.

Mangrove Cay, Andros; and Nassau.

Opeas subula Pfeiffer.

Nassau, in loose earth; and Abaco, near Marsh Harbor.

Opeas micra C. B. Adams.

Nassau.

Opeas pauperculа C. B. Adams.

Mangrove Cay, Andros, and at Nassau in the grounds of the Colonial Hotel and on the Grantstown road.

This species, described from Jamaica has not hitherto been known from the Bahamas.

Lamellaxis pallidus C. B. Adams.

Nassau, in the grounds of the Colonial Hotel and on the Grantstown road, in loose earth.

This form was described as a *Bulimus* by Adams and has been referred to a group named *Lamellaxis* by Strebel and identified by von Martens with *Leptinaria*. Originally named from Jamaica it is now first reported from the Bahamas.

Orthalicus undatus Bruguière.

Nassau, with hermit crabs; Mangrove Cay, Andros, one specimen with crabs. None found living.

Melaniella gracillima Pfeiffer.

Mangrove Cay, Andros; under leaves and bushes on a side hill near Fort Charlotte, Nassau, N. P.

Caecilioides acicula Müller.

A single specimen was found with *Opeas* in loose earth, on the Grantstown road, Nassau. This species has been reported from Florida and Bermuda but not hitherto from the Bahamas.

Zonitoides minusculus Binney.

A single specimen was obtained in the grounds of the Colonial Hotel, Nassau.

The species is new to the Bahamas though previously known from Florida, Bermuda and Jamaica.

Succinea ochracina Gundlach?

Young specimens, distinguished from the following species by the more acute spire and deep orange color, were found near Johnson's place and Lake Cunningham, also in the grounds of the Hotel Victoria in Nassau. The typical locality is in Cuba.

Succinea barbadensis Guilding.

Very common at Mangrove Cay, Andros, and near Fort Charlotte, Nassau.

The young cover the shell to a greater or less extent with pellets of their own fæces.

Veronicella schivelyæ var. *bahamensis* nov. Pl. LIX, fig. 1.

Near Johnson's place, Nassau, and on Little Abaco, at Nield's place.

This large *Veronicella,* while not agreeing in all particulars with Dr. Pilsbry's account of the Bermuda species, is evidently closely allied to it.

The young are translucent white with two dark lines enclosing a broad, elongated area on the back which is pale and outside of which the sides of the mantle are finely gray-dotted. The foot and whole underside are pale waxen but the oculiferous tentacles are conspicuous by their dark slate color in contrast to the rest of the animal.

The adult is of a purplish livid color in general, though sometimes albinistic; the back shows a narrow light median dorsal line, and two broad somewhat hazy dark bands corresponding to the dark lines of the young, but the pale dorsal area is more or less clouded with grayish purple. The genital pore is not so close to the foot as in Dr. Pilsbry's specimens from Bermuda, and the lighter dorsal area is broader in Bahama specimens. The animal itself, as far as one can determine from alcoholic specimens, is rather broader and stouter than the Bermuda variety. It measures, in two specimens; total length 54 and 63 mm., breadth 25.5 and 26.5; the sole is 9 and 10 broad, and 54.5 and 62.5 long; the genital pore is distant from the anterior edge of the mantle 31 and 33; from the posterior edge of the mantle 23 and 27; from the sole 3 and 2.5, from the lateral edge of the mantle 5 and 6 mm.

Numerous specimens were obtained at Nassau, and it is probably widespread, but rarely noticed by travelers because it is nocturnal in its habits. It seems to have been the only slug noted during the expedition.

Segmentina (*Planorbula*) *dentata* Gould.

Mangrove Cay, Andros.

Mr. Bryant writes "I found all the *Planorbis* in dried up pond holes in the lime rock near what is called the "shore road," really a path, about a mile from the village of Mangrove Cay. When I saw them there had been little rain and there was nothing but mud with some grass and reeds growing in it, and one or two crab holes where there was still some water and very soft mud. Near the top of the holes and over most of the bottom were scattered large numbers of dead *Planorbis* and a few *Physa.* The first hole I ex-

amined was about ten or fifteen feet across and about four feet deep. I found in it only one or two Physas but there were a great many *Planorbis*. I was much puzzled as to whence they came, and made a careful search to see if I could find any live ones. I examined the mud and looked in the very bottom where the mud was still soft but could unearth none. Then I looked in the crab holes, feeling round the sides and taking up handfulls of mud from the sides and bottom and straining it through my net. I thought there must be considerable numbers of live ones somewhere or there would not be so many freshly dead ones, but could find no trace of any. Later I discovered a pond where the natives shoot wild fowl in winter, and called by them the "duck pond." Hereabouts the land is nowhere more than eight or ten feet above high water mark, and probably the water in this pond was in subterranean communication with the sea, not more than a quarter of a mile away. The pond was one hundred yards or more from where I found the *Planorbis*. It was a natural pond, very shallow, but with a soft muddy bottom over the lime rock, and all about it bushes and trees were thick. The trees extended into the water, growing in it to a depth of two feet. In the pond were some fresh water algæ and other plants. I thought I had found where my *Planorbis* came from, but on most careful search I could not find one alive or dead, but did find a few *Physa*, some of which were alive. The pond was the only one I heard of, remote from the village, difficult of access and there was no water about where anything in the shape of aquatic plants had been imported. Therefore I think there is no possibility of the *Physa* being imported. Probably the water was salt or at least brackish near the bottom. There were a number of the lime sinks which had been cleaned out to form "wells," and one or two deep sinks which had water in them fresh enough to drink. In one of these, two miles from the duck pond and back of the village I found one *Physa*."

The explanation, as far as the planorbes are concerned, is that they form epiphragms when the waters of the pool dry up and remain in this condition alive but quiescent until the rains fill up the pools again. Many of the specimens of *P. redfieldi* showed the epiphragm, usually double, very clearly through the translucent shell. I believe this habit has not before been recorded of *Planorbis*.

I agree entirely with Mr. Bryant's conclusion that these fresh water species are indigenous and native to the islands. There are many ways by which such pools may be stocked. The greater profusion of specimens in the pools and their scarcity in the permanent

pond may well be due to the presence in the pond of fish and wild fowl, which feed eagerly on such fresh water snails, but could not live in pools periodically dry. The majority of the numerous *Planorbis* obtained by Mr. Bryant was composed of the *P. redfieldi,* the *Segmentina* is comparatively rare. Years ago I received from Dr. Brown a single specimen of the latter, from the drift on the shores of the lagoon at Watling Island.

Planorbis redfieldi C. B. Adams.

Mangrove Cay, Andros, common.

This species was originally described from Jamaica, and is an addition to the fauna of the Bahamas; the manner of its occurrence has been described under the last species.

Physa acuta Draparnaud.

Mangrove Cay, Andros; not abundant. Watling Island (J. J. Brown).

This species was identified by D'Orbigny in 1842, from Cuba, Jamaica, Guadeloupe and Martinique, as well as South Europe and the Canary Islands. Later it was found in large numbers in one of the hothouses at Kew Gardens by Jeffreys, introduced with aquatic plants from the West Indies. Dr. Brown Goode collected specimens from water tanks at Bermuda, which were identified by Dr. Pilsbry. I received a single specimen from Watling Island. Now Mr. Bryant adds it to the fauna of the Bahamas. I formerly supposed this species to be an introduction from Europe, but am now quite confident that it is indigenous to the Antillean region. I have carefully compared European and Antillean specimens and find the differences slight and inconstant, though one would not expect a fresh water shell to have such a geographical distribution. An anatomical examination will be required to remove all lingering doubts as to their identity. Mr. Bryant's specimens are all immature.

Tralia pusilla Gmelin.

Sweetings village, Abaco. Also Florida, Bermuda, etc.

Melampus (Detracia) bulloides Montagu.

Andros Island at Mangrove Cay.

A single young specimen was obtained. The species had previously been reported from Nassau. Also at Riding Point, Grand Bahama.

Pedipes mirabilis Muhlfeldt, var. *tridens* Pfr.

Andros, at Daulin Bay, Sweeting's village, Abaco.

This species is quite variable in the coarseness of its spiral sculpture. Young specimens with fine sculpture and in which the median

callus inside the outer lip has not yet formed, were named *tridens* by Pfeiffer, and when the callus appears are *quadridens* C. B. Adams. The very young are *ovalis* C. B. Adams, and the old coarsely sculptured and strongly dentate specimens are typical *mirabilis*. The form varies from ovate-elevated to naticoid. I think this is the first time this species has been definitely reported from the Bahamas.

Blauneria pellucida Pfeiffer.

A single specimen was obtained at Mangrove Cay.

This minute shell has been reported from Florida, the West Indies and Bermuda, but not previously from the Bahamas. It is either generally rare or from its small size and subterranean habits has been overlooked by collectors.

Siphonaria alternata Say.

Mangrove Cay, Andros; Little Abaco.

This had previously been obtained at Gun Cay, by the U. S. Fish Commission.

Chondropoma revinctum Poey.

On the Grantstown road, Nassau, N. P., U. S. Fish Commission and Owen Bryant.

This species, which has been kindly identified for me by Dr. Pilsbry from specimens in the Academy of Natural Sciences, was originally described from the south side of Cuba near Manzanillo. There are several nearly allied species in Haiti. Having been found at a wide interval by two expeditions it seems that it must have become well established, though recently introduced, since it is so handsome and conspicuous a species that, existing now in the best explored region of the group, it could hardly, if present, have been overlooked by all previous collectors.

It is now first recorded from the Bahamas.

Rhytidopoma cuploca new species. Pl. LIX, fig. 6.

Inagua, Bland. Three specimens.

I describe this species here, because it is an addition to the Bahaman fauna discovered under a wrong name in the Museum collection while endeavoring to identify Mr. Owen Bryant's material. It was received by Stearns from Bland and subsequently was acquired by the National Museum.

Shell small, with four moderately convex whorls after decollation; somewhat irregularly but strongly crenulate at the suture; color honey yellow, more or less faintly articulated, striped, dotted or clouded with pale reddish brown; sculpture of fine low spiral threads (about 10 on the penultimate whorl) with narrower and more

translucent interspaces, crossed by much finer, regular, sharply defined axial threadlets, most evident in the interspaces and giving a textile effect to the surface; the revolving threads a little stronger on the base; umbilicus small, perforate, not covered by the narrow peristome; termination of the last whorl not free from the body; aperture, short, ovate, yellowish, showing the brown spirals internally; peristome narrow, slightly reflected, little thickened, but somewhat angular behind; operculum thin, the calcareous layer thin, its disposition similar to that of *Ctenopoma rugulosum* Pfr., the type of the genus *Rhytidopoma* Sykes. Height of shell 8.0; maximum diameter of shell 4.0; of aperture 2.6 mm.

Opisthosiphon bahamensis Shuttleworth.

Typical locality Nassau; collected by Mr. Bryant in various localities at and near Nassau; Great Abaco, on the Sugar Loaves rocks; Little Abaco near Nield's and Marsh Harbor, and Mathews Point on the south side of Abaco.

This is the most abundant species of the family in the Bahamas, and, considering its wide distribution, is very uniform in character; differing chiefly in color, the Nassau variety being frequently of a livid purpuraceous tint while the specimens from the outer and eastern islands are more disposed to assume a yellowish color with fairly distinct dottings or streaks of brown. The differences of size, probably correlated with the food supply, are not very marked. This, with the allied *O. rawsoni* Pfr., belongs to a new genus[1] characterized by a little tube which is formed behind the posterior angle of the peristome and turned with its aperture close to the surface of the preceding whorl; so that, when the animal protects itself by hermetically closing the aperture of the shell with the operculum, air can still be admitted through this little tube to the interior, though the orifice is not large enough to give access to any enemy of the species. This tube at a later stage is closed up permanently.

Specimens of this species in the National Museum were named by Bland *C. biforme* Pfeiffer, but I am informed by Mr. E. A. Smith of the British Museum that the true *biforme* is a species of *Chondropoma*.

Helicina fasciata Lamarck.

Mangrove Cay, Andros, in dead sisal; Riding Point, Grand Bahama; Cuba.

This species appears to be rather rare, as Mr. Bryant obtained only a few immature and one dead adult specimen. It had not previously

[1] Cf. Proc. Malac. Soc. London, VI, p. 209, 1905.

been recorded from the Bahamas in print, though there are Bahama specimens in the National Museum collection, obtained many years ago by the late Dr. Henry Bryant of Boston. A curious fact was developed while making the comparisons with other specimens of *Helicina*. Nearly fifty years ago a single specimen of *Helicina* was sent to the Smithsonian from Key Biscayne, Florida, and identified as *H. subglobulosa* Poey, a Cuban form. There are specimens of *H. subglobulosa* from Florida in the collection, of more recent date, but the original specimen is undoubtedly an example of *H. fasciata*. The figure in the Land and fresh water Shells of North America (f. 220) part III, p. 111, is very poor.

Helicina bryanti Pfeiffer.

Inagua, Dr. H. Bryant; Nassau and Mangrove Cay, Andros, Owen Bryant.

This seems to be common and widespread. Large bleached specimens from Turk's Island are *H. candida* Pfeiffer, and *H. calida* Weinland, from Crooked Island can hardly be distinguished.

Schazicheila bahamensis Pfeiffer.

One specimen was found on the Grantstown road near Nassau, and another at Mathews Point on the south side of Abaco, by Mr. Bryant.

The fresh shell is of a brownish red color, the tint changing after death and exposure to a pale yellow of very different aspect.

Truncatella pulchella Pfeiffer.

Mangrove Cay, Andros, Hopetown and Sweeting's village, Abaco.

Truncatella bilabiata Pfeiffer.

Nassau, N. P., also in beach drift at Long Rock, Abaco.

Truncatella clathrus Lowe.

Riding Point, Grand Bahama, Sweeting's village, Abaco.

This has not previously been recorded from the Bahamas though registered from Bermuda, Florida, Porto Rico, St. Thomas, etc.

Assiminea concolor C. B. Adams.

Jamaica (Adams as *Phasianella concolor*); Lagoon of Watling's Island; Bermuda (C. B. Adams and C. A. Davis); under stones at high water. Key West (Hemphill); Point Pinallis near Tampa, Florida (E. Jewett and R. E. C. Stearns); Mangrove Cay, south bight of Andros Island (Owen Bryant).

This differs from *A. affinis* Orbigny, in its more rotund and polished whorls, and somewhat larger size. *A. concinna* C. B. Adams (as *Cingula*) has an impressed line in front of the suture. I have not seen specimens, but the species was described from Ja-

maica. The species from Cedar Keys which I listed in Proc. U. S. Nat. Mus., VI, p. 335, as *A. auberiana* Orbigny, is not Orbigny's species. The latter is probably a Rissoid, and the Cedar Keys species is likely to prove identical with *A. turricula* H. C. Lea (as *Cingula*) described from South Carolina. The possession of cotypes of C. B. Adams *Phasianella concolor,* received from the author, enables me to feel certain about the identification of Mr. Bryant's shells.

Cyrena colorata Prime.

South side of Abaco, and at Riding Point, Grand Bahama.

This is not exactly a fresh water shell, but occurs in the mud of brackish marshes.

Cyrenoida americana Morelet.

South side of Abaco; also Cuba and Porto Rico.

This has a *situs* similar to that of the last species.

EXPLANATION OF PLATES

All the figures are natural size.

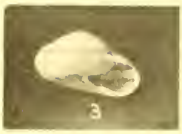
PLATE LVIII

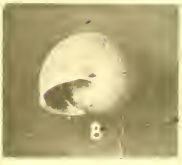
FIG. 1. *Cerion variabile* Dall, var. *pupilla* Dall....p. 440
2. *Cerion inconspicum* Dall....p. 439
3. *Cerion oweni* Dall, var. *vermiculum* Dall....p. 444
4. *Cerion inconspicuum* var. *lacunorum* Dall....p. 439
5. *Cerion plegmatum* Dall....p. 441
6. *Cerion variabile* Dall, typical form....p. 440
7. *Cerion watlingense* Dall....p. 438
8. *Cerion oweni* var. *reticulatum* Dall. The bluish spiral color-markings do not photograph clearly....p. 44
9. *Cerion brunneum* Dall....p. 441
10. *Cerion oweni* var. *incisum* Dall....p. 444
11. *Cerion northropi* Dall....p. 442
12. *Cerion oweni* Dall, typical form....p. 443
13. *Cerion canonicum* Dall....p. 439
14. *Cerion variabile* var. *saurodon* Dall....p. 440
15. *Cerion glans* Küster, var. *obesum* Dall....p. 437

PLATE LIX

FIG. 1. *Veronicella schivelyæ* Pilsbry, var. *bahamensis* Dall. The color-markings and the median pale line do not show in this photograph from an alcoholic specimen....p. 446
2, 7, 8. *Cepolis androsi* Dall....p. 436
3, 4, 5. *Cepolis smirna* Dall. The specimen figured is smaller than the type and slightly bleached....p. 435
6. *Rhytidopoma cuploca* Dall....p. 449

BAHAMA SHELLS





BAHAMA SHELLS