

Department of the Interior:

U. S. NATIONAL MUSEUM.

BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

No. 25.

CONTRIBUTIONS TO THE NATURAL HISTORY
OF THE BERMUDAS.

VOLUME I.

EDITED BY

J. MATTHEW JONES and GEORGE BROWN GOODE.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1884.

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PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

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ADVERTISEMENT.

This work is the thirty-first of a series of papers intended to illustrate the collections of natural history and ethnology belonging to the United States, and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

It has been prepared at the request of the Institution, and printed by authority of the honorable Secretary of the Interior.

The publications of the National Museum consist of two series—the Bulletins, of which this is No. 25, in continuous series, and the Proceedings, of which the sixth volume is now in press.

The volumes of proceedings are printed signature by signature, each issue having its own date, and a small edition of each signature is distributed to libraries promptly after its publication.

From time to time the publications of the Museum which have been issued separately are combined together and issued as volumes of the Miscellaneous Collections. These are struck off from the stereotype plates from which the first edition was printed, and in this form are distributed by the Smithsonian Institution to libraries and scientific societies throughout the world. Volume 13 of these collections includes Bulletins 1 to 10 inclusive; volume 19, vols. 1 and 2 of the Proceedings; volume 22, vols. 3 and 4 of the Proceedings; and volume 23, Bulletins 11 to 15 inclusive.

Full lists of the publications of the Museum may be found in the current catalogues of the publications of the Smithsonian Institution.

SPENCER F. BAIRD,

Secretary of the Smithsonian Institution.

SMITHSONIAN INSTITUTION,

Washington, June 1, 1884.

CONTRIBUTIONS

TO THE



NATURAL HISTORY OF THE BERMUDAS.

EDITED BY

J. MATTHEW JONES AND GEORGE BROWN GOODE.

VOL. I.

- PART I.—GEOLOGYBy PROF. WILLIAM NORTH RICE.
PART II.—BOTANYBy GEN. SIR JOHN HENRY LEFROY.
PART III.—MAMMALSBy J. MATTHEW JONES.
PART IV.—BIRDS.....By CAPT. SAVILE G. REID.
PART V.—NOTES ON BIRDSBy DR. C. HART MERRIAM.
PART VI.—REPTILESBy SAMUEL GARMAN.
PART VII.—ANNELIDS.....By PROF. H. E. WEBSTER.
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PREFACE.

The Bermudas or Somers Islands, since their discovery in 1515, have given origin to a literature of very considerable extent. Not only have they been the subject of discussion in many a book of history and travel, they have inspired the poetic fancies of Thomas Moore and Andrew Marvell, and supplied Shakespeare with an environment for "The Winter's Tale." The natural history of this little archipelago has also been a fruitful subject of description from the days of Sil Jourdan and his quaint old black-letter volume, "The Wreck of the Sea Adventure." The literature of the islands, as will be shown in a bibliography to be published in a subsequent part of this work, includes many papers of considerable importance from a scientific standpoint.

The "enchanted isles" have proved very attractive to naturalists, especially during the past decade, and to the old list of observers, containing such names as those of J. Matthew Jones, Sir William Reid, Sir Henry Lefroy, Lansdowne Guilding, H. B. Tristram, J. L. Hurdis, Col. H. M. Drummond-Hay, Colonel Nelson, Dr. J. J. Rein, and Colonel Wedderburn, must be added those of Sir Wyville Thomson and his assistants on the Challenger staff, especially John Murray and H. N. Moseley, Prof. W. G. Farlow, Mr. Walter Faxon, Dr. C. Hart Merriam, Mr. J. W. Fewkes, Prof. William North Rice, Dr. G. W. Hawes, Dr. F. M. Hamlin, and Prof. A. S. Bickmore. The field of marine zoology is as yet hardly touched. No place can be more suitable for a laboratory of biology.

The only book in which a general survey of the flora and fauna of the islands has been attempted is in "The Naturalist in Bermuda," an octavo volume of 200 pages, published in London in 1859, by John Matthew Jones, Esq., F. L. S., barrister, of the Middle Temple. This work is full of interest and suggestion. It bears upon its title page as its legend, the well-known saying of White of Selborne, "*Every kingdom, every province, should have its own monographer*," was conceived and executed in the spirit of a true disciple of the Hampshire sage, and received a well-merited encomium from Darwin in his *Origin of Species*.

In "The Naturalist in Bermuda," Mr. Jones made no attempt to

grapple with marine zoology, the book being devoted almost entirely to the land animals and plants. The lists are all, of course, very incomplete in the light of subsequent discoveries, but the book is a classic, and will always remain so. Since 1859, a number of special papers have been published by Mr. Jones, and by others; and a series of faunal lists, very nearly complete for vertebrates, is given in Mr. Jones' *Visitors' Guide to Bermuda*, printed in 1876.

Dr. T. L. Godet, in his "*Bermuda*," published in 1860, attempted to discuss the zoology of the islands, but his chapters on "natural history," "shells," and "corals" give evidence not only of ignorance of but shameful dishonesty in his methods of book-making.

The plan of the work, of which the first instalment is now published, was arranged by Mr. Jones and the writer of this preface in the spring of 1877, at the close of a second winter of joint exploration of the islands. Mr. Jones has collected in Bermuda for several winters, between 1859 and 1876, and has become the standard authority on matters relating to the natural history of the islands. It has been our purpose in our joint work to bring together in convenient form that which is known of the natural history of the islands, and to make a complete series of faunal and floral lists, to serve as a starting point for future works in the study of the region.

In the present volume are printed seven separate papers.

Professor Rice's essay upon the Geology of the islands (Part I) is the result of a careful reconnaissance during a six weeks' visit in the spring of 1877. The previous work of Nelson and Thomson, and the discussion of the region by Dana, have been taken into consideration in the preparation of this paper.

The Bermudian Flora, by Sir John Henry Lefroy (Part II), is the result of the studies of that eminent geographer while governor of the islands from 1871 to 1877, most of the specific identifications having been made at the Royal Botanical Gardens, Kew. An especial feature of interest in this paper is the thorough manner in which the native flora has been differentiated from the extensive exotic flora, which has been energetically increased by the Bermudians since the very beginning of the colony in 1609. It is of great value, too, as a record of the successes of Sir Henry Lefroy himself in acclimatizing numerous species. During his administration, two or three hundred species of trees, shrubs, and plants were introduced from different quarters, particularly from

the Royal Gardens at Kew, which will greatly extend the interest of the Bermudas as a botanic garden.

The catalogue of Bermuda Mammals (Part III), by Mr. J. Matthew Jones, is one of the monographs, which will probably never be extended unless by the addition of certain species of whales.

Capt. Savile G. Reid's essay on Bermuda Ornithology (Part IV) is the final result of the labors of Jones, Hurdis, Wedderburn, and others, and may be regarded as a final report. Much of the completeness of this list is due to the labors of a most ingenious local collector, Mr. John T. Bartram, of Stock's Point, whose little museum is full of interesting material.

Dr. C. Hart Merriam, in a short visit to the islands in 1878, discovered one or two additional species of Birds, which, by special request, he records in Part V.

Mr. Samuel Garman's paper on Bermudian Herpetology (Part VI) is undoubtedly a final statement. The discussion of the marine turtles in this paper is of great general interest.

Professor Webster's paper on the Annelids (Part VII) is only a beginning, being based upon a very incomplete collection gathered in connection with other work.

A number of other papers are in preparation, and it is hoped that they may be completed within the next year. Among these are a second edition of the present writer's Fishes of Bermuda, and papers on the Crustaceans, by Prof. S. I. Smith; the Radiates, by Prof. A. E. Verrill; the Sponges, by Prof. A. Hyatt; the Spiders, by J. H. Emerton; and the Mollusks, by J. Matthew Jones.

G. BROWN GOODE.

WASHINGTON, *April 2*, 1884.



INTRODUCTION.

By J. MATTHEW JONES, F. R. S. C.

Alone in mid-ocean, about 600 miles east of the Carolina coast, lies the little group of islets known as Bermuda. In former days, when light-houses were few and far between, and navigation was beset with greater danger and difficulty, these islands were counted among the greatest terrors of the deep; lying in the track of merchantmen from Europe to America, and surrounded by barrier reefs extending far out to sea, they too often became the last home of mariners, whose ships were driven in fury upon the breakers and dashed to atoms amid the seething foam.

There are no bold scenic effects to impress the visitor on his first approach; no elevated peaks or cone-like craters, nor hillside gorges. All is on a small scale, and although with islands and rocky islets together, over three hundred may be counted, yet the whole lie in a space of 23 miles by 3, and so slightly raised are they above the ocean surface that the very highest point of land only reaches 250 feet.

The Gulf Stream flows between the Bermudas and the eastern coast of the United States, trending to the northeast as it reaches the latitude of New York, thus affording the ocean to the southward protection from the cold winds of the north during the winter months. On the eastern edge of this heated concourse of waters which circle around from south to northeast are the Bermudas; while within this semicircular space float vast masses of Gulf-weed, the *Sargassum bacciferum*, intermingled with driftwood, seeds of trees and plants, and abundance of other vegetable matter bearing upon its surface, or within its tangled masses, myriads of mollusks, crustaceans, and other invertebrate forms, which float hither and thither as the winds direct, while thousands of fishes frequent these aquatic preserves to feed upon them. It is to these floating masses of Gulf-weed that the northern shores of America owe the presence of isolated examples of tropic fishes taken generally during the later months of summer. During that period the ocean surface is rarely disturbed by violent storms, and the Gulf weed floats along in im-

mense fields, propelled both by the swift, warm current and southerly winds to a far more northerly point than usual; indeed, instances are known, one very recently, where turtles have been captured while floating on the water within 100 miles of Halifax.

The denizens of this favorable cover, thus brought within a comparatively short distance of the northeast coast of America, wander away right and left, and many strike the shores and are captured, to afford wonder to those who are unaccustomed to their singular forms. Thus it is that on the coast of Nova Scotia are found, almost every summer, examples of West Indian *Balistes*, *Fistularia*, *Hemirhamphus*, *Exocoetus*, &c., also the well-known "Portuguese Man-of-War" (*Physalia physalis*); while many large seeds of West Indian plants, such as *Entada scandens*, *Mucuna urens*, and others chiefly belonging to the family *Leguminosæ*, are picked up at Sable Island, which lies 80 or more miles off the Nova Scotian coast.

North and west of the islands, at a distance from shore in some directions of 10 or more miles, lie what are known as the outer reefs, a belt of submerged rocks coated with *Serpula*, whose hard, irregularly-twisted calcareous tubes often form incrustations an inch or more in thickness, and various other forms, particularly nullipores, stony seaweeds of a rosy color, which occur as wart-like processes on all portions of the reef rock. Within the outer reefs, and coating the inner edges of these submerged rocks, grow numerous species of corals.

Thousands of other objects help to form the population of these outer reefs and contribute not a little to their growth, while myriads of tropic fishes lurk in the snug holes and corners formed in the wave-worn rocks. Through certain channels in this reef vessels reach the harbors within; but without the aid of the pilots, a daring, clever set of fellows, with eyes as sharp as hawks and nerves that never fail, it would be useless to attempt an entrance.

The latitude of the light-house on Gibb's Hill is $32^{\circ} 15' 4''$ N.; longitude, $64^{\circ} 51' 36''$ W. In shape the Bermudas form a narrow elongated strip of land about 23 miles long, running east and west, bent inwards at one extremity like a fish-hook, and indented throughout by inlets, with numerous little inlets scattered over the whole extent. The distance from Cape Hatteras is about 600 miles; and from Halifax 750 miles. The land lies very low, but it is pleasingly diversified throughout its whole area with little hills and dales. It is covered over large areas with groves of cedar (*Juniperus barbadensis*), having an under-

wood of sage bush (*Lantana odorata*) and (*L. camara*). A few depressions, slightly below the sea level, are wet and marshy, and are grown up with coarse grasses, reeds, and sedges, with palmettoes and cedars where the ground is dry, and mangroves and avicennias where it is muddy. There are no lakes, streams, or wells of fresh water, the only water-supply being derived from the clouds. The roofs of the houses are sloped and whitewashed so as to allow the rain to run freely into tanks under ground; some of these are of large size and keep an abundance of water perfectly clear and fresh for two or three months, if droughts should occur.

The climate, during the winter months of November, December, January February, and March, is simply charming, the thermometer usually ranging from 60° to 70°. Cool and pleasant breezes almost continually prevail; and as may well be imagined from its position on the wide ocean, the air of Bermuda is the purest of the pure.

The trade of Bermuda is carried on by a dozen or more island vessels and others from England, United States, Nova Scotia, and Prince Edward Island. The island vessels are built of cedar, the most durable of all woods; but as that timber is getting scarce, ship-building is not carried on to the extent it was formerly. The principal exports are onions, tomatoes, and potatoes, chiefly to New York, during the months of April, May, and June. Arrowroot has also been for many years a well-known Bermudian product, commanding a high price in every part of the world.

Bermuda is a British military post, and there is one line regiment always garrisoned there, as well as artillery and engineers; and the dock-yard is one of the stations of the West Indian squadron of the British navy.

The following brief topographical description of the islands is here presented as an introduction to the special natural history papers which are to follow, and which often contain reference to special localities. It should be read in connection with the map.

Beginning at the eastern extremity of the archipelago, we observe upon the map.

St. George's.—This was once the chief town of the islands and residence of the governor; but Hamilton, which is more centrally situate, was chosen in its stead about the latter part of the last century. The town is quaint and interesting; the streets are so narrow that in places two portly persons would almost jostle each other in passing. They were constructed when carriages were unknown on the islands.

These narrow streets, winding up the hill on which much of the town is built, with their gardens hemmed in by high walls, over which hang different species of cacti, with papaws, bananas, and plantains towering above, and here and there the graceful form of the palmetto surmounting the same, will remind the visitor of a small Spanish or Eastern town.

To obtain a good view of the harbor and surrounding country the visitor should proceed either up to the Signal Station or Barrack Hill, from which will be obtained an extensive prospect. Not far beyond the barracks, and eastward of there, is a small cove on the northern shore, known as "Buildings Bay," said to be the place where, in 1609, Sir George Somers had his cedar vessel, in which he proceeded to Virginia, built. There are three or four strong forts commanding the channel through the reefs on the north side.

David's Island, forming the southern boundary of St. George's harbor, is quite small. It is here that some of the best arrowroot is grown and manufactured; and this island also furnishes most of the pilots who hail from the east end of the islands. There is a whalehouse here, which is now, however, rarely used, as the whale fishery has been much neglected of late years. In its many pretty little bays and inlets a variety of shells and sea-weeds may be obtained; thousands of sea anemones occur in the clear shallow water, and many species of crustaceans and echinoderms may be collected on the white sandy bottom, which renders their forms wonderfully conspicuous.

Castle Harbor.—This charming sheet of water, the beauties of which, on a bright sunny day, with sufficient breeze to ripple the surface of the azure waters, are not to be excelled in any part of the world, is an excellent collecting place. The day's work should commence by a visit to Castle Island, which commands the entrance to the harbor. The visitor can only land upon the island at one spot on its southern side. Here are the ruins of what, many years ago, was a fort of some importance, called "The King's Castle;" the old brick oven, too, has become a cave with miniature stalactites. The island is about 270 yards long by 90 broad. It is a lonely, desolate spot, the home of the lizard and prickly pear (*Opuntia*).

In sailing along for Southampton Island, which is the next to attract attention, the entrance channel to Castle Harbor will be crossed, showing how intricate the passage must have been for the large West Indian mail steamers, which made this harbor their port of entry for some few

years after 1842. Southampton Island was also fortified for the same purpose as Castle Island.

Nearly opposite Southampton Island, but at some little distance from the shore on the south side, stands "Gurnet Rock," an isolated mass, very interesting to an ornithologist, from its being almost the only spot in the Bermudas where breeds that rare bird, the dusky shearwater (*Puffinus obscurus*), which is evidently the curious bird mentioned by Capt. John Smith in his account of the Bermudas (which is included in his "History of Virginia") about two centuries ago, under the name of the "cahow." The rock cannot be landed upon in safety, owing to the almost continued swell of the ocean; and many are the hair-breadth 'scapes that have occurred when enthusiastic naturalists, who are somewhat rare in the Bermudas, have daringly attempted the task. The last effort was made by Lieutenant Reid, R. E., about 1874. Getting as near as possible in the boat, he had to make a spring just as the swell lifted her up the side of the rock; but although he luckily succeeded in making good his footing, he received some severe bruises from the jagged nature of the surface. His embarkation was happily effected without injury, and he had the pleasure of carrying home a fine young specimen of the bird which he had secured.

After passing Southampton Island the western shore of Nonsuch Island comes in view. This island now belongs to the military department. Several rare species of mollusks may be obtained in the sandy bays of its southern shore.

Cooper's Island next claims attention; here many shells and sea-weeds are to be found, as well as a few interesting plants growing on the sandy hillocks which are such conspicuous features in its scenery. If the day should be calm instead of breezy, the visitor will do well to pay attention to the curious objects beneath the waters of the harbor. The bottom is everywhere studded with reefs, on which grow corals, gorgonias, sponges, &c., in profusion, and if the boat be provided with a pair of long-handled nippers, any quantity of specimens may be obtained.

Mullet Bay.—About half a mile from St. George's, is Mullet Bay, one of the many pretty little inlets with which the islands are everywhere indented.

Stock's Point.—Past Mullet Bay, and forming its western shore, runs out toward Castle Harbor an irregular promontory known as Stock's Point. At the extreme end of this point, and situate in a pretty nook, is the residence of Mr. J. T. Bartram, whose collection of Bermudian stuffed birds and fishes is the only one of its kind in the islands.

The Causeway.—This bridge was constructed in England and sent out in pieces. Just at its end, on the Walsingham side, is a deep pool, which is known as “Blue Hole,” in which many kinds of fish may be seen disporting themselves in the clear water.

Walsingham Caves.—About a quarter of a mile up the hilly road which leads from the causeway towards Hamilton, stands a small wooden shed on the left hand; while on the right, a rough and narrow road is seen, which leads to the famous caves which have afforded for many years the most singular scenes to be met with in the Bermudas. It would take pages to describe properly the various portions of these subterranean recesses, which present the usual appearance of stalactitic halls and spacious chambers, floored with transparent waters, on which no boat has ever yet been launched to explore the darkness beyond.

Walsingham.—The grounds about Walsingham are by far the most picturesque in the islands, presenting a singular chaotic appearance of broken rocks, caverns, and ponds, interspersed with grassy patches and thickets in which numerous kinds of trees and shrubs mat their foliage with that of the orange and lemon. Here may be found species of plants unknown in any other part of the islands, and in the clear waters which occur in almost every cavern mouth, the most brilliant-hued fishes may be seen. The coffee-tree grows luxuriantly at Walsingham, and a climbing jasmine overruns both rocks and trees profusely. The soil of this district is different to that of other parts, being of a bright brick-red.

Paynter Vale.—Not far from Walsingham, and snugly ensconced in a grove of fine old trees, lies all that remains of the old homestead of the Paynter family; the house a complete ruin, with ferns growing out of the crevices, and bananas, papaws, and cedars hemming in its remains on every side. Near what was formerly the principal entrance gate stands a magnificent fiddle-wood tree (*Citharexylum*), the parent of all the fiddle-wood trees in Bermuda. It was brought from Barbadoes about the year 1829.

A little east of the ruined house an avenue of tall tapering cedars leads to the old burial place of the family, which has recently been covered over with blocks of stone to prevent desecration. Climbing a steep hill near by, the visitor finds himself in full view of Harrington Sound, with the Flatt's Bridge and village in the distance, while a little higher he will find a patch of red ground, on which it is said nothing in the shape of vegetation has ever been known to grow. About 80 yards northwards of this patch, and situate in the adjoining wood, is a small cave,

known as "Chalk Cave." On returning and recrossing the red patch, there will be seen on the left hand a deep hollow called "Plantain Hole," in which coffee, myrtle, wild cherry, fiddle-wood, and other trees are growing and entwining their branches together.

After leaving this cavernous depression and ascending the steep hill above for a short distance the visitor will come suddenly in view of Castle Harbor. Descending the slope before him and arriving at the shore he will find himself near the Government Limestone Quarry, from which large blocks of compact stone have been taken for building fortifications, and which is frequently referred to below in Professor Rice's paper on the geology of the islands. To the southeast is a cave called "Cooper's Hole," well worth a visit. Returning northwards, along the margin of the water, the visitor will perceive a current of water rushing almost under his feet, which is supposed to flow under the land from Harrington Sound. Still continuing northwards he will soon arrive at a rail fence, which, if he follows along through ferns, myrtle, orange, &c., will bring him to another deep hollow, called "Little Plantain Hole." At one time this was overrun with citron and orange trees; but very few, owing to the great disease of 1854, now remain. Still following the fence he will again arrive at the ruins of the old Paynter homestead, from which he started. Just outside the entrance gate, and across the public road, on the shore of Harrington Sound, will be seen a cavern in the cliff, which goes by the name of "Shark's Hole." If a boat can be obtained this cavern is well worth investigating, for several species of sea-weeds are to be obtained on the rocks on either side; while in the recesses of the cave beyond, by the aid of a torch, a beautiful collection of stalactites can be seen. A fine collection of stalactites from this cave are preserved in the National Museum and in that of Wesleyan University, Middletown.

Tucker's Town.—The land which lies between Paynter Vale and the south shore, including the long narrow neck which stretches out eastward to Castle Island, is known as Tucker's Town. Tucker's Town ponds are favorite resorts of the migratory water birds which visit Bermuda from the North American continent during the fall and winter months. Along the shores of these ponds the mangrove (*Rhizophora*) grows luxuriantly wherever congenial mud affords its roots a resting place.

The walks about the sand hills near the shore will be found interesting to the lover of nature, for many interesting maritime plants may be

seen, while along the coral strand are found rare sea-weeds and shells, mingled with the pink-colored nullipore and *débris* of the reefs.

Devil's Hole.—This is a cavernous recess filled with salt water on the south side of Harrington Sound, about midway between Walsingham and the Flatts. For years it has been one of the “lions” of Bermuda, as it generally contains a stock of groupers (*Serrani*), and sundry other fishes; which swim about and can be as easily seen as if in an aquarium. Here will be found a species of ground shark, which, although not uncommon on the east coast of America, is, from its retired habits, very rarely seen. The angel-fish (*Holacanthus*) will be observed disporting itself in the clear waters, as if proud of its splendid livery. The groupers themselves are easily recognizable, as they crowd together with open mouths in hopes of a feed when the visitor arrives.

Harrington Sound, which lies before the visitor as he emerges from the entrance door to Devil's Hole, probably possesses in itself and its surroundings more picturesque scenery than any other locality in the islands. Its surface is usually calm, owing to its land-locked position, and a boating excursion on its waters, especially about the shores of Trunk Island, will reveal many submarine wonders to the eye of the naturalist, in the form of gorgonias, sponges, corals, and hosts of other things. Its northern shore, westward of Bailey's Bay Church, presents a series of high cliffs, in many places quite inaccessible, much to the satisfaction of the several pairs of tropic birds which here annually, in perfect security, make their nesting places and rear their young. From the water is seen the high cliff known as “Devil's Head,” its face all ragged and torn by the storms of many winters. From out its numerous crevices spring dwarf trees and shrubs, whose only holdfast appears to be the solid rock on which they grow, while circling around its shattered brow the tropic birds lazily float, mingling their plaintive cries with the sounds of the rippling wavelets which dash on the rock-bound shore a hundred feet below. Harrington Sound, owing to the fact that the rise and fall of the tide is almost nothing, is one of the best places for collecting corals, such as *Millepora Oculina*, *Mæandrina*, *Porites*, *Mycedium*, and *Siderastræa*. Here occur in great numbers the Bermuda scollop, *Pecten ziczac*, fished for at a depth of 5 or 6 fathoms by means of long-handled nipper.

Flatt's Bridge.—At the western end of Harrington Sound there is an outlet into Flatt's Harbor, through which the tide ebbs and flows with great impetus. This channel has from the earliest times been spanned

by a bridge. In the torrent below the bridge Mr. Goode discovered *Amphiorus* in 1877, and this vicinity is one of the best collecting grounds in the islands. Much may be done by raking up stones and sponges from the bottom and examining their interstices for small animals.

Flatt's Harbor.—In days of yore this pretty little inlet of the sea presented a different aspect, for the shores, particularly at its head, were lined with wharves from which good-sized vessels discharged their cargoes. It was, in fact, one of the ports of Bermuda, and considerable trade was carried on here. Even now the extent of the ruins of several houses testifies to their capacity in former times. All, however, now wears a look of desolation; the moldering walls with the carved portals are draped with the prickly cactus, while gigantic papaws and plantains raise their leafy crowns above the whole.

Gibbons' Bay.—About a quarter of a mile from Flatt's Village, on the north shore road to Hamilton, on the right hand, will be seen a little sandy bay, with an island beyond, joined by a causeway of large stone blocks to the shore. The little bay to the right is known as Gibbons' Bay. It is an excellent place for collecting shells and sea-weeds, as also marine invertebrates, which are common under the stones and sand at low water. In the little rock pools here and along the north shore occur frequently groups of young *Verella*, while in the crevices of the rocks, after a northerly storm, may be found great masses of Gulf weed covered with pelagic crustaceans and hydroids.

Mount Langton.—Government House is situated on an elevated ridge of land, and commands a fine view of the sea-coast all along the north shore. The garden contains interesting examples of foreign trees, shrubs, and plants. It was here that Lady Turner, between 1826 and 1832, planted the first weeping willow ever seen in the islands, a species now very common. Governor Reid, about 1841, planted the India-rubber trees which stand near the steps leading down to the garden. The wampee and litchi trees were also planted by him. The large silk cotton trees in the garden were planted by Governor Elliott about 1850, and Sir Henry Lefroy, when governor, added largely to the list.

Peniston's Pond.—This beautiful little lake, screened from the ocean by small hills covered with cedar, lies on the south shore of the islands, about a mile and a half west of the Devil's Hole.

The waters of Peniston's Pond are quite brackish, having communication with the outer sea by underground channels. In heavy southerly storms a perfect stream of water is forced over the shore rocks at the

eastern end, giving it the appearance of a natural water-course, which is a rare sight in Bermudas except during a heavy rainfall. On the southern shore of this pond, about its center, and within a few paces of the water, are wells used for the purpose of watering cattle. The water they contain, like all similar excavations throughout the islands, is fresh above, but brackish beneath, as soon as the sea level is reached. This is, of course, owing to the simple reason that fresh water is lighter than salt. The islanders declare that there are "springs" of fresh water in various places. This is only true to the extent of supply furnished by percolation of rain water to the depth such springs are found in; a few weeks of drought would be sufficient to prove the fallacy of the assertion that such sources are really springs. Bermuda, which is merely the peak of a submarine mountain, rising to a height of nearly four miles from the bottom of the ocean, having its whole land area honey-combed throughout above, and most probably far below the level of the sea, can possess no fresh-water supply from below, and can only rely upon rainfalls for the necessary fluid. No *hard* water, therefore, is to be had in these islands; none but what the tanks supply, running from roofs and smoothed surfaces, constructed for the purpose. Peniston's Pond is a great resort of water fowl and waders, which visit Bermuda during the winter; and many a rare bird has been obtained by ornithologists in favorable seasons.

Spanish Rock.—A few yards east of the cattle wells spoken of, just at the base of the shore hills, an open grassy patch will be seen, having a mud hole about its center. After passing this, proceed up through the cedar grove in front, and immediately at the top a little pathway will be seen leading to the cliff beyond. Care must be taken on approaching this precipice, for if a false step be made, there is nothing to prevent a fall of fully 100 feet into the foaming waters below. The flattened rock, on which is an inscription consisting of a monogram and the date 1543, supposed to have been made by the Spaniard, Ferdinand Camelo, is cut, is a little below the crest of the cliff. It is one of the oldest historical monuments in America.

Hungary Bay.—About three miles from Devonshire Bay, along the coast westward, is Hungary Bay, an excellent place to gain some idea of what a tropical mangrove swamp must be. This is, of course, only one on a very small scale; but still the mangrove grows luxuriantly here. With the exception of the crabs which climb the trees, hardly a sign of animal life is observable. Fine specimens of *Littorina scabra* occur on

the trunks of the mangrove trees near the mud. *Melampus flavus* and *M. Redfieldii* also occur in abundance under stones at the edge of the mud. Near the entrance to this bay on the eastern side will be seen the ruins of a building formerly used as a magazine. A battery existed here also.

It was just inside the mouth of the bay that, in the month of January, 1860, the largest example of the ribbon fish (*Regalecus*) ever yet seen was captured. The head and some other portions of the fish were forwarded as a present to the British Museum. The total length of the specimen was 16 feet 7 inches.

Regaining the public road again, the visitor is now only a mile or so from the capital town of the islands.

Hamilton.—Incorporated June 30, 1793, and named after the then governor, Henry Hamilton, the town has very slowly but steadily increased in size.

Below the hill on which the Sessions House stands is the "Public Building," erected in 1839. Here are the "Custom-House," "Colonial Office," "Public Library," "Council Chamber," &c., while on the landing of the upper staircase are a few cases containing enough natural history specimens to make the visitor regret that the inhabitants do not possess sufficient enterprise to establish a museum. No place in the world presents the facilities Bermuda does for the collection of marine specimens; and as nearly all could be preserved in alcohol, there is less excuse for the omission. It is hoped, however, that ere long the tide of improvement will at last reach "the remote Bermudas," and that institutions generally established in other communities for their benefit and satisfaction will be considered necessary in this.

There are several interesting localities within walking distance of Hamilton which will well repay the trouble taken in reaching them. Proceeding along the public road going to the eastward, skirting the shore of Hamilton Harbor, and before the end of the harbor is reached, there may be seen four fine specimens of the cabbage palm (*Oreodoxa oleracea*) with trunks as smooth as ivory, and bearing above the curious bunch of foliage which, from its resemblance to the vegetable in question, has given the tree its name. One or two specimens of the cocoanut palm (*Cocos nucifera*), are also to be seen here, as well as numerous shrubs, natives of the West Indies. At the end of the wall which skirts this property will be seen in a cottage garden a tree possessing to all appearances crimson leaves. This is the fire plant, or

burning bush (*Poinciana pulcherrima*), and the gaily colored leaves will be found to be merely the elongated petals of the flower. At the bend of the road round the harbor head, and immediately by the guard wall, in the dark, offensive looking mud, several mangrove trees grow, having attached to the roots and lower parts numbers of an oyster-looking shell (*Perna ephippium*). A little further on, on the right-hand side of the road, will be observed a fine tamarind tree (*Tamarindus indica*) standing in a neat little garden, while on the left, just beyond the tanks, runs along the wall side a hedge of the "snuff plant" (*Buddleja americana*).

Paget Sand Hills.—This sterile locality, which is an extremely wild and lonely spot, is well worth a visit, and close examination also, for here can be seen the mode adopted by nature to form the Bermudas; viz, drifting sand gradually increasing its deposits and elevating the land; thereby overcoming cedar groves and cultivated ground, and in one place even the dwelling of man.

On arriving at the northeast corner of the sand hills, the encroachment of the drifting sand will at once be perceived, as the mass, some 10 feet in depth, is now gradually covering a small garden. According to the observations made by persons residing close to, this overwhelming body has advanced over the cultivated land about 80 yards during the last twenty-five years. At the northeast corner of the hills will be seen, among some oleander trees near the top, the chimney of a cottage which formerly stood there, inhabited by a colored family. It is now wholly buried in the drifting sand, save the chimney, which alone rises above the mass to show the position of the structure.

With the exception of a few irregular patches here and there, and the long reach of white sand gradually encroaching on the cultivated ground at the northeast corner, the whole slope, which some twenty years ago was almost wholly clear drift sand, with a few patches of bent grass in scattered spots upon it, is now clothed with wild plants and shrubs, as well as young cedars, which will no doubt in a few years attain goodly dimensions, and, with the aid of the universal underwood of sage-bush, put an end to the further encroachments of the sand drift.

On the western side of the sand hills there is now a plateau of about half an acre, or perhaps more, of hardened drift sand, forming gradually into rock. On its face are cracks filling with drift sand, showing that the sun doubtless affects this hardened surface. Elevated protuberances of a foot or so in height, rise amid this plateau, having each a hole or depression at the center. These denote the sites in which cedar trees

formerly grew. At the east end of the hills may be seen the gradual decay of cedar stumps, exhibiting more clearly the several stages of change, which are the more worthy of study in consequence of the light they throw upon the many curious chimney-pot looking structures everywhere to be met with on the Bermuda shores.

Indeed, the naturalist, on carefully observing the whole appearance of these sand hills, and taking into consideration the facts which are so prominently placed before him, will be able to form a very fair idea of the circumstances under which the Bermudas attained their present elevation after the great submergence.

At the foot of these hills, along the shore, runs a charming stretch of sandy beach.

At low water, and almost within wading distance of the beach, will be seen a series of "boilers" as they are locally termed, *i. e.*, rounded masses of rock hollowed within, containing sea water, having their margins raised by incrusting *serpulæ*. The origin of these boilers, which occur all round the shores, has never been satisfactorily ascertained, and would form a very interesting source of inquiry for any one desirous of advancing scientific knowledge.

The Royal Engineer Quarries.—These quarries, where the most compact stone to be found in the islands is procured for the purpose of building fortifications and other Government work, are situate upon the shore about a quarter of a mile east of the sand hills.

The Light-house.—This commanding structure, which possesses one of the most powerful lights in the world, is situate on the summit of Gibb's Hill. The light itself stands 362 feet above the sea level. From an elevation of only 10 feet above the water it can be clearly seen at a distance of 25 miles, while at 40 feet it can be easily distinguished 30 miles off.

There are some very pretty little coves under the light-house, having their shores irregularly indented by rocks which have in some places become detached from the cliffs above. Upon these rocks, and on the sides of the cliffs, grows a pretty species of stock (*Matthiola*), and in holes burrowed in the more friable rock, the tropic bird (*Phaëton*) makes its nest. Many species of algæ can be collected about the shore, and the conchologist must not forget that it was under stones at this locality where the Rev. J. B. Freer, in 1861, discovered the fine *Pupa*, an inch in length, which has never been taken since. Here, too, occurs in great quantities *Imperator calcar*, and also occasionally the large *Echinus esculentus*.

Somerset Bridge connects the island of Somerset or Sandy's with the main island. To the westward of the bridge, on a neck of land which protects the water of Elis Harbor from the ocean swell without, rises "Wreck Hill," so named from its being the spot from which the best view of the western reefs could be obtained, which have always been considered the most dangerous of all the reefs surrounding the islands.

Elis Harbor.—A perfect little gem of an inlet, which, to be seen in its greatest perfection, should be visited on a bright sunny day, when its waters appear of the lightest emerald tint. It is an excellent collecting ground for crustaceans, holothurians, and naked mollusks.

Mangrove Bay.—At the extremity of Somerset Island lies Mangrove Bay, so named from the number of those trees which formerly grew around its margin. The scenery is very pretty hereabouts, although the land is almost level with the water. Boat excursions about the bay and adjoining shores reveal many interesting forms to the naturalist, especially among the submerged rocks near the shore. On the other side of the neck of land which divides Mangrove Bay from the ocean lies a stretch of sandy beach well worth examining, for as it lies open to the heavy westerly gales, some fine specimens of sponges and seaweeds are often cast ashore.

Watford and Boaz Islands connect Somerset with Ireland Island, and do not contain much to interest the visitor, as their surfaces have been partially leveled by convict labor, during the time that Bermuda was unhappily burdened by the presence of the worst of criminals transported from the mother country.

Ireland Isle.—Probably the most important position in the Bermudas is Ireland Isle, which, although not much more than a mile in length, or a quarter of one in breadth, contains the dock-yard and other establishments connected with the Royal Navy. The Camber is a dock sheltered from the usual swell of the ocean by an excellent breakwater. But the principal feature of attraction is "the Great Bermuda Dock," a floating mass of iron, the largest structure of the kind in the world. In preparing the bed for this dock there was made an excavation to the depth of 54 feet below low water, and no less than 1,200,000 cubic feet of sand and coral *débris* were removed for that purpose. The geological teachings of this section are referred to in Professor Rice's paper.

The anchorage ground opposite Ireland, on its east side, where one or two men-of-war are generally to be seen, is known as "Grassy Bay."

There was an old lady living in Bermuda in 1876, aged 93, who well

recollected the time when Ireland and Boaz were inhabited by fishermen, who lived in huts made of boughs of cedar, and brush for sides, and having the roofs thatched with palmetto leaves.

The Islands in the Sound.—The large sheet of water, which is inclosed by the curve of the land running from Paget Parish to Ireland Island, is known as “The Great Sound.” It contains several islands, generally of small size, but the larger ones are very picturesque. Tucker’s Island, which lies close in shore near Somerset Bridge, is well worth a visit, and the visitor should not omit to notice a lovely little cavern upon it.

Marshal Island and Godet Island lie east of the latter, and around their shores may be obtained many fine specimens of sponges, zoophytes, and small crustaceans.

Brackish Pond, an extensive morass about two miles east of Hamilton, on the skirts of which grow some fine specimens of cedar trees, while amongst the close thicket of shrubs and palmettos which tenant its interior some giant ferns and aquatic plants of divers species occur which are not seen in the open. In this dense region the ornithologist will find a good collecting ground, as owing to the difficulty of traversing the treacherous bog hardly any one disturbs the solitude which almost continually prevails here. Here also, up in the branches of the old cedars, and occasionally in the shrubs around, may be procured the curiously constructed nest of the tree rat (*Mus tectorum*), a species recently added to the Bermudian fauna.

PART I.

THE GEOLOGY OF BERMUDA.

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THE GEOLOGY OF BERMUDA.

HISTORY AND LITERATURE OF THE SUBJECT.

The Geology of Bermuda has already been the subject of more or less elaborate discussion by several authors. An important memoir by Lieut. (now Maj. Gen.) Richard I. Nelson, R. E., is contained in the Transactions of the Geological Society of London, Second Series, Vol. V., Part first, pp. 103-123. This paper is based on observations made in the years 1827-1833, while the author was stationed on the islands. The excavations made in the construction of the fortifications under his charge afforded him admirable opportunities for the study of the structure of the rocks, and his work gives evidence of thorough and conscientious investigation. Though written before the genius of Darwin and Dana had given the world the true interpretation of coral reefs and islands, and therefore failing to trace aright the history of the events recorded in the Bermudian limestones, this paper is invaluable to subsequent investigators as a store-house of facts. J. Matthew Jones, F. L. S., who has resided a number of years in Bermuda and paid much attention to its natural history, has given us important geological notices in his *Naturalist in Bermuda*,* and *Visitor's Guide*,† and various papers in the Proceedings and Transactions of the Nova Scotia Institute of Natural Science, and in *Nature*. In 1873 Bermuda was visited by the Challenger expedition, and important observations were made on the geology, as well as other branches of the natural history, of the islands. Some important points, notably the origin of the "red earth," were first explained by the naturalists of the Challenger. Bermuda forms the subject of an interesting chapter in Sir Wyville Thomson's work.‡ Brief references to Bermudian geology are contained in the classical works

* *The Naturalist in Bermuda; a Sketch of the Geology, Zoology, and Botany of that remarkable group of islands; together with Meteorological Observations.* By John Matthew Jones. With a map and illustrations. London, 1859.

† *The Visitor's Guide to Bermuda.* With a sketch of its Natural History. By J. Matthew Jones. London.

‡ *The Atlantic.* A preliminary account of the general results of the Exploring Voyage of H. M. S. Challenger, during the year 1873 and the early part of the year 1876. By Sir C. Wyville Thomson. New York, 1878. Vol. I., Chapter IV.

of Darwin* and Dana;† but their treatment of the subject is less satisfactory than it would have been if these masters of the theory of coral formations had had the opportunity of visiting the islands. My own observations were made during a sojourn of a few weeks in the winter of 1876-'77. It is a pleasure to me in this connection to acknowledge my obligations to Prof. G. Brown Goode, of the Smithsonian Institution, J. Matthew Jones, F. L. S., Maj. Gen. Sir J. H. Lefroy, Governor of Bermuda at the time of my visit, Mr. James Carruthers, of Her Majesty's Dock-yard, and Mr. C. M. Allen, United States Consul, for calling my attention to interesting and instructive localities; and especially to Prof. James D. Dana for most important suggestions in regard to the problems presented by the islands, communicated in a conversation just before my visit.

PHYSICAL GEOGRAPHY OF BERMUDA.

The reefs and islands comprised under the name of Bermuda are nearly included between the parallels of $32^{\circ} 10'$ and $32^{\circ} 20'$ N., and between the meridians of $64^{\circ} 40'$ and 65° W. from Greenwich. The line of the outer reef incloses an approximately elliptical area, whose major and minor axes are respectively about twenty-five and about twelve miles in length. The major axis trends about N. 50° E. Only a very small part of the elliptical area thus described is dry land. The dry land is almost confined to the south-easterly side of the ellipse, forming a narrow and broken strip about fifteen miles in length, and nowhere more than three miles in width. The areas of the principal islands are as follows:

	Acres.
The Main Island	9, 725
St. George's Island.....	706
Somerset Island	702
David's Island.....	527
Ireland Island	133

The whole area of dry land in the archipelago is estimated at 12,378 acres.‡

About three quarters of the whole area of dry land is included in the Main Island, or Bermuda proper. The line of the Main Island is con-

* The Structure and Distribution of Coral Reefs. By Charles Darwin. Second edition. London, 1874. Appendix, pp. 264, 265.

† Corals and Coral Islands. By James D. Dana. New York, 1879. pp. 218-221, 361, 370, 391, 393-395.

‡ The Bermuda Pocket Almanack. Bermuda, 1877. pp. 60, 61.

tinued north-eastward by St. George's and David's Islands. The south-western extremity of the Main Island bends around towards the north, and the curve is thence continued northward and north-eastward by the islands Somerset and Ireland. The hook-like south-west extremity of the Main Island, with its continuation in Somerset and Ireland Islands, incloses a lagoon called Great Sound. Two other lagoons are included within the chain of islands on the southeast side of the ellipse: namely, Harrington Sound, inclosed entirely by the Main Island, and communicating by a passage not exceeding 50 feet in width with the great elliptical lagoon inclosed by the outer reef; and Castle Harbor, inclosed by the eastern end of the Main Island, St. George's, David's, and several smaller islands. The central part of the Main Island is occupied by a peat-bog. The surface of this part of the island is elevated but little above the sea-level; and the peat, as I am informed by General Lefroy, extends to a depth of 40 or 50 feet below the sea-level—a depth about equal to that of the great lagoon inclosed by the outer reef. This bog appears to mark the situation of a small lagoon now entirely filled up.

The surface of the land is considerably diversified, though nowhere attaining any great elevation. The highest hills are only about 250 feet above the level of the sea.

In consequence of the small extent of the land both horizontally and vertically, and the extreme porosity of the rock of which it is composed, there are no springs, streams, or lakes of fresh water in the islands. The rain that falls, where it is not collected in artificial tanks, soaks down into the porous rock until it mingles near the level of the sea with the salt water with which the lower parts of the rock are saturated. The water in the ponds and marshes, which occupy considerable areas in the less elevated parts of the islands, is always brackish. The inhabitants depend for their supply of water chiefly on the collection of rain in tanks. These tanks are connected not only with the roofs of the houses, but with areas on the hillsides scraped smooth for that purpose.

The chain of islands is bordered on the south-east by a fringing reef, distant perhaps a quarter of a mile on the average from the shore. On the north side of the ellipse the line of the reef is nearly continuous; but the only dry land is the little islet, or group of islets, the largest of which, called North Rock, is about 8 feet in diameter and about 14 feet in height.

Along the course of the reef are numerous rings of calcareous rock, a few feet or yards in diameter, rising to a level of about 2 feet above

low-tide level. The crest of these circular ridges is formed in large part of the calcareous tubes of tubicolous worms. They are appropriately called by Nelson "serpuline reefs."* The elevation of these serpuline reefs above low-tide level is due to the fact that these worms, unlike the coral-forming anthozoa and hydrozoa, can survive an exposure for some hours out of water. There are circular ridges of coral reef similar to these serpuline reefs, except that they are less elevated, their upward growth being limited by the inability of the coral animals to survive an exposure above the water. These circular reefs are called, commonly, "boilers." The form of both varieties of these "boilers" illustrates well Chamisso's theory of atolls—a theory which, though inadequate for the explanation of atolls in general, recognized a principle which has played an important part in the history of coral formations.†

The depth of water in the elliptical lagoon inclosed by the outer reef is generally 6 or 8 fathoms, though there are many patches of reef scattered through the lagoon. Outside of the reef the water deepens gradually for a mile or more, the average depth at the distance of a mile being only about 12 fathoms. A little further from the shore a more abrupt descent commences, the depth at a distance of 10 miles in every direction except the south-west being from 1,500 to 2,250 fathoms. "Twenty miles to the southwest-by-west from the Bermudas there are two submerged banks, 20 to 47 fathoms under water, showing that the Bermudas are not completely alone, and demonstrating that they cover a summit in a range of heights."‡ The Challenger expedition obtained a sounding of 2,950 fathoms about 300 miles further on in the same direction, indicating apparently that the range is not of great extent in that direction.§

IS BERMUDA AN ATOLL?

The general form of the Bermuda Archipelago, as represented on a map, is strikingly suggestive of the belief that it is a compound atoll, similar to Mahlos Mahdoo and some other atolls of the Maldiva Archipelago. The great depth of water within a few miles of the islands, and the exclusively calcareous character of the rocks of which the islands are composed, tend to confirm this impression. Dana|| and Thomson¶ regard Bermuda as truly an atoll. Darwin apparently

**Op. cit.*, pp. 105, 116.

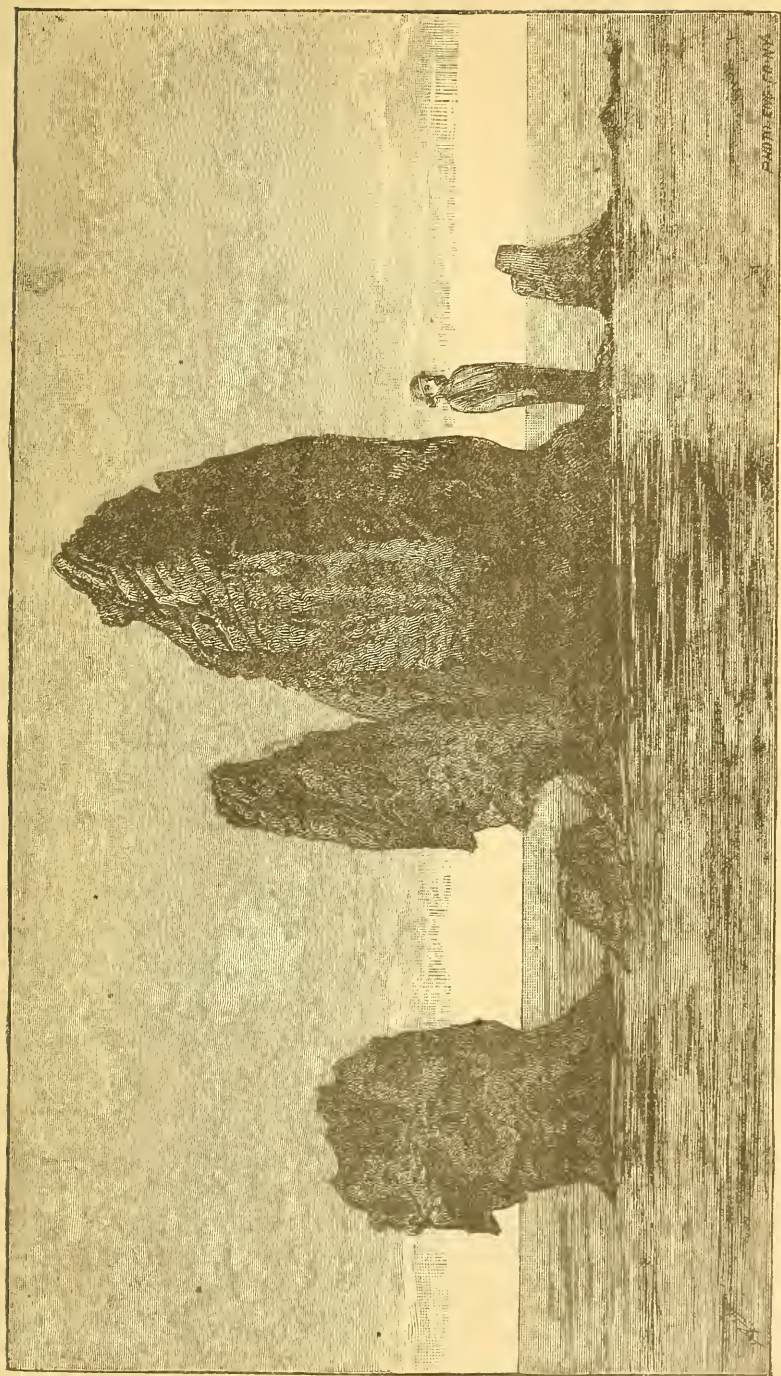
† Darwin, *Coral Reefs*, pp. 78, 118.

‡ Dana, *Corals and Coral Islands*, p. 370.

§ Thomson, *op. cit.*, Vol. I., p. 286.

|| *Corals and Coral Islands*, p. 218.

¶ *Op. cit.*, Vol. I., p. 280.



NORTH ROCK, BERMUDA.—(From a photograph by J. R. Hoyl, of Hamilton, Bermuda.)

inclines to the belief that it is not an atoll, and calls attention to the following points in which Bermuda differs from atolls in general: "First, in the margin of the reef not forming a flat, solid surface, which is laid bare at low water; secondly, in the water gradually shoaling for nearly a mile and a half in width round the entire reef; and, thirdly, in the size, height, and extraordinary form of the islands, which present little resemblance to the long, narrow, simple islets, seldom exceeding half a mile in breadth, which surmount the annular reefs of almost all the atolls in the Indian and Pacific Oceans."* These differences are certainly of great importance; yet I believe that they are all capable of explanation on the theory that Bermuda is an atoll. I believe we may recognize the causes of these peculiarities in the peculiar history of the islands. Bermuda has a special interest in view of its position. It is perhaps the only atoll in the Atlantic Ocean, the atoll character of the Bahamas being at least doubtful.† Bermuda is also remarkable as being more remote from the equator than any other coral formation, the growth of corals there being rendered possible by the influence of the Gulf Stream.

THE CORAL LIMESTONE AND ITS VARIETIES.

As already stated, the only rock found *in situ* in Bermuda, if we except the peat or muck of the bogs, and the "red earth," which will be specially treated of hereafter, is limestone. The rock varies, however, exceedingly in texture. The extremes are an unconsolidated, calcareous sand, a subcrystalline rock of almost flinty compactness, and a coarsely crystalline stalagmite. The hard, compact rock is locally called "base rock," and the name is employed in that sense by Nelson;‡ but it does not uniformly underlie the softer rocks, nor is there any evidence that it is older than they.

Dana distinguishes in coral reefs and islands three kinds of rock in respect of the mode of formation: viz., reef-rock, beach sand-rock, and drift sand-rock.§ The reef-rock is that which constitutes the reefs proper. It is formed by the accumulation of the more or less finely comminuted material of the corals, shells, and other skeletons of marine animals, on the grounds where the corals are growing. It can therefore never be formed at an elevation much above low-tide. The beach sand-rock is formed by the action of the waves sweeping up against the

* Coral Reefs, p. 264.

† Darwin, Coral Reefs, pp. 256-259; Dana, Corals and Coral Islands, pp. 213-218.

‡ *Op. cit.*, p. 109.

§ Corals and Coral Islands, Ch. II.

shore the calcareous sands resulting from the disintegration of shells and corals, precisely as in other places the waves sweep up the silicious sands of an ordinary beach. The beach sand-rock is therefore formed chiefly between the levels of low and high tide, though the action of storms may cause it to extend somewhat above the ordinary high-tide level. The drift sand-rock is formed by the action of winds seizing the dry sand at the upper margin of the beach and transporting it further inland and to greater elevations. The drift sand-rock may therefore be formed at any level, from that of high-tide upward. The cement which converts all these fragmental deposits into solid rock is formed by the solution of the calcareous particles themselves.

A most important step in the investigation of the history of a coral island is the recognition of the respective distribution of these three kinds of rock. The discrimination of the true reef-rock from the sand-rocks is not usually a difficult task. The reef-rock, whether fossiliferous or not, is usually readily distinguishable by the impalpable compactness of parts of the mass, resulting from the consolidation of the finely triturated coral mud; while the sand-rocks, even when appearing quite compact, will almost invariably reveal on closer examination their arenaceous texture.

The discrimination of the two kinds of sand-rock from each other is much more difficult. Indeed, no absolute criteria exist for the discrimination of beach-rock and drift-rock, though serviceable indications may be obtained from the texture, lamination, and fossil contents of the rocks. The beach-rock is, on the average, of coarser grain than the drift-rock, as the wind sweeps along chiefly the finer sands; but some specimens of the drift-rock are coarser than some specimens of the beach-rock. The beach-rock is, on the average, more perfectly consolidated than the drift-rock, but in this character also both rocks vary widely. Drift-rock, when submerged by a subsidence subsequent to its deposition, may come to assume the degree of consolidation usually observed in beach-rock. On the south shore of the Main Island, near Spanish Rock, I observed strata perfectly continuous dipping towards the water, exceedingly hard at the margin of the water, but becoming considerably softer as they were traced upward and landward. Mr. Ebenezer Bell, who some years ago had charge of some works in progress on Boaz Island, informed me that he found that rock so soft as to crumble in one's fingers became quite hard on immersion for a week or a fortnight in sea-water. Some of the hardest rock which I observed in

Bermuda was shown by other characters to be unmistakably drift-rock. A more reliable distinction is found in the lamination, the beach-rock showing a gentle and tolerably uniform dip towards the water, while the drift-rock shows the high and extremely irregular dips which are characteristic of wind-blown sands. But not every section exhibits characters sufficiently marked to settle the nature of the rock, since the beach-structure admits of a considerable degree of irregularity in dip, while wind-blown sands in a long ridge or dune may have for long distances a gentle and nearly uniform dip. The indication furnished by the fossil contents of the rocks is important. The beach-rock is often richly fossiliferous, containing shells and pieces of coral of considerable size. The drift-rock can, of course, ordinarily contain no relics of marine animals except fragments so small as to be blown by the wind. A high wind can, however, sweep along pieces of shell and coral larger and heavier than one would at first suppose. The flat, thin valves of lamelibranchs are more likely to occur in drift-rock than shells of gastropods. In the recent sand-drifts at Tucker's Town I collected a number of organic relics, thinking they might afford some indication as to the limit of size of marine fossils likely to occur in the drift-rock. Among them were a fragment of the shell of *Spondylus* weighing 1.8 grammes; a valve of *Chama*, incrustated with tubes of *Serpula*, weighing 2.7 grammes; and a fragment of the coral *Mycedium*, having a length of 45 millimeters and a breadth of 30 millimeters, and weighing 8.3 grammes. Of most frequent occurrence in the drift-rock of Bermuda is the large and heavy shell of *Livona pica*. This seems at first sight utterly paradoxical, as the shell is altogether too large to be moved by the wind. The true explanation is undoubtedly that given by Nelson, who states that he has on more than one occasion seen soldier-crabs running about in these shells.* While the presence of marine fossils in a sand-rock is an indication that it is a beach-rock, the drift-rock is quite apt to contain the shells of land snails. The presence of snail-shells cannot, however, be regarded as a sure proof of drift-rock, since they might easily be washed down by rains from a bank or bluff above the beach, and imbedded in the beach sands.

That there can be no absolute distinction between beach-rock and drift-rock will be manifest from the consideration that the two formations are in their origin strictly continuous. Near Elbow Bay and at Tucker's Town, sand-hills are now in process of formation. At the

* *Op. cit.*, p. 112.

former locality the advancing dune has nearly buried two small houses, and is encroaching upon cultivated grounds. Nelson* gives us an account of the beginning of this invasion, and Thomson† describes the present condition of the dune. At these localities there is an opportunity to study the mode of formation of the two kinds of rock, and to observe the perfect continuity of the two formations. As the wind catches the sand on the upper and drier part of the beach, and moves it landward, the beach merges above, with no perceptible line of demarkation, into the base of the sand-hills. But though, in the nature of the case, there can be no absolute distinction between beach-rock and drift-rock, it is practicable, by noting all the indications of texture, lamination, and fossil contents, to decide in most cases with confidence whether the rock exposed in a particular section is beach-rock or drift-rock.

There is no reef-rock in Bermuda *in situ* above the water-level. Nelson speaks of blocks of coral reef imbedded in the rock on the south shore of the Main Island.‡ I observed detached blocks of reef-rock on the shore at Stock's Point, but none *in situ*. In the statement, "Toward the shores the solid reef-rock outcrops,"§ Dana is apparently misled, in a way very natural for one who has not visited the locality, by a statement of Nelson. The rock described in Dana's quotation from Nelson as "very hard, fine-grained or compact limestone, in which scarcely a vestige of organic structure is to be seen,"|| shows on careful examination an arenaceous texture, though consolidated by percolating waters to a sub-stalagmitic condition, exhibits traces of irregular lamination, and contains fossil shells of land snails. It is unquestionably an extremely hard drift-rock, such as is found at several localities and at various altitudes.

Beach-rock occurs at various localities along the shore of the islands. Thomson's statement that the Bermuda limestone is entirely an "Æolian formation"¶ is certainly inaccurate. I have never observed the beach-rock in the interior, nor at an altitude of more than about 15 feet above the water-level. To the category of beach-rock may undoubtedly be referred the fossiliferous stratum described by Nelson** as appearing in the chain of islands stretching across the mouth of Crow-lane or Hamilton Harbor. This stratum reaches an elevation of about 6 feet above the water, and its nearly horizontal lamination con-

* *Op. cit.*, pp. 109, 110.

† *Op. cit.*, Vol. I., pp. 289-291.

‡ *Op. cit.*, p. 111.

§ Dana, *Corals and Coral Islands*, p. 220.

|| Nelson, *op. cit.*, p. 106.

¶ *Op. cit.*, Vol. I., p. 287.

** *Op. cit.*, p. 111.

trasts strongly with the high dips observable in the drift-rock on the Main Island in the vicinity of Hamilton. Near the south end of Ireland Island I observed a stratum of almost perfectly unconsolidated sand abounding in shells. In the lower layers of this sand the shells are of marine species. In the uppermost layer the shells are those of land snails. The stratum is overlain by ordinary drift-rock. The layers containing marine shells attain an elevation of about 15 feet above the water. In spite of the lack of consolidation of this stratum, I can hardly doubt that its lower layers are truly a beach formation, and that the transition from marine to terrestrial fossils marks an epoch of elevation. A conglomerate evidently of beach origin appears at Stock's Point, the part which remains *in situ* on the north shore of the Point reaching an elevation of about 12 feet; though Mr. J. T. Bartram, an enthusiastic self-taught naturalist residing near the spot, assured me that, in a part of the bluff which has been removed in quarrying, the conglomerate attained a considerably greater altitude. Unquestionable beach-rock appears on the north shore of St. George's near Fort Catherine. The rock is at that locality richly fossiliferous. But the most instructive localities of the beach-rock which I have observed are along the south shore of the Main Island. At various points along that shore the beach-rock, more or less fossiliferous, with its characteristic gentle dip seaward, forms a gently sloping platform, at the back of which rises a low cliff of drift-rock with steep landward dips. The most thoroughly satisfactory locality which I observed for the exhibition of the relations of the two rocks is near Devonshire Bay. There the beach-rock, which forms (as in other localities along the south shore) a platform gently sloping seaward, is in places fine-grained and very hard, in other places fossiliferous with shells and pieces of coral of considerable size. It is surmounted by the usual low cliff of drift-rock with high landward dips. Overlying the hard beach-rock of the shore platform, and underlying the drift-rock of the cliff, is a stratum of unconsolidated sand, resembling that observed at Ireland Island, containing marine shells in its lower layers and land shells in its uppermost layer. This stratum of sand is mentioned by Nelson,* though he seems to have misapprehended the character and relations of the fossiliferous beach-rock which underlies the sand stratum. The sand stratum is not recognizable at some of the localities on the south shore where the phenomena are in other respects as above described.

* *Op. cit.*, p. 107.

All the rock in the interior of the islands, and all the rock which is much elevated above the water level, is drift-rock. Indeed, substantially the whole mass of the rock visible in the islands is drift-rock. Probably along the greater part of the shore drift-rock comes down to the water's edge, no other rock being visible. I was not able to examine the whole of the coast, but I am confident that drift-rock comes down to the water's edge along the north shore of the Main Island from Spanish Point to the Flats and beyond, along a part at least of the north shore of St. George's, around a considerable part, if not the whole, of the circuit of Harrington Sound and Castle Harbor, around the head of Hamilton Harbor, and in many places even along the south shore of the Main Island—the region of the coast in which the beach-rock is best exhibited. North Rock, at least in its upper part, is formed of drift-rock, as is shown by the high dip of its lamination.* This character of the rock is well shown in the beautiful photograph taken by Mr. J. R. Heyl, of Hamilton. The drift-rock is usually very soft, so that it is quarried out for building purposes by means of a peculiar long-handled chisel, in large blocks, which are readily sawn into pieces of such size and shape as may be wanted. Most of the houses in Bermuda are built of this exceedingly friable stone. Even the roofs are covered with the same material sawn into thin slabs. This stone, covered with a coat of whitewash, is sufficiently durable for ordinary buildings in the Bermudian climate. Exposed to the frosts of a New England winter, it would of course crumble very rapidly. Although the drift-rock is generally quite soft and friable, it is sometimes very firmly consolidated and of a subcrystalline texture. This hard rock is quarried like any ancient limestone or marble, and has been used in the construction of the fortifications and other government works. The quarries at Paynter's Vale and on Ireland Island are in such a hard drift-rock. The quarry of the Royal Engineers, near Elbow Bay, appears to be in beach-rock. It would be a curious question, what are the precise conditions which have determined the varying action of the rains on these accumulations of coral sand. While in some localities the sands have been merely washed away and dissolved, in others the grains have been, by the action of the same rains, cemented firmly together, until the rock has assumed a sub-stalagmitic texture, as at Paynter's Vale.

The usual softness of this drift-rock has made it a matter of small labor and expense to secure easy grades on most of the roads in the

* Thomson, *op. cit.*, Vol. I., p. 296.

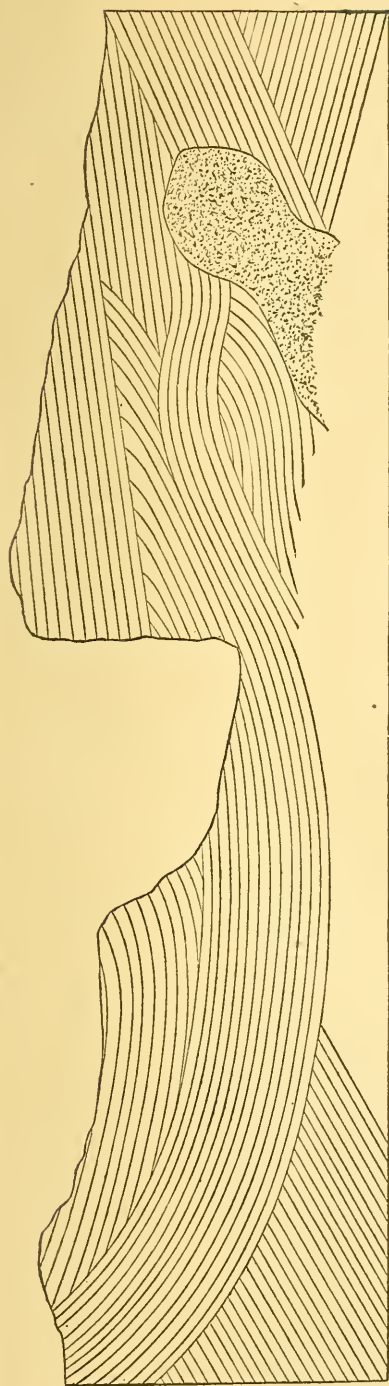


FIG. 1. Section near TRINITY CHURCH, Hamilton, Bermuda.

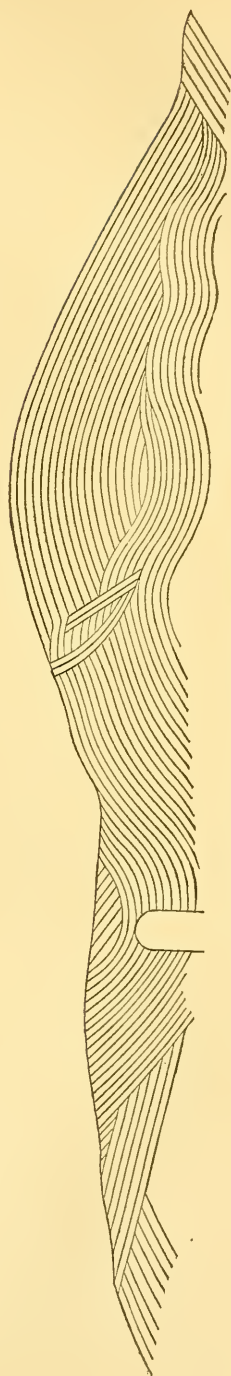


FIG. 2. Section near GOVERNMENT HOUSE, Mount Langton, Bermuda.



islands, by making quite deep cuts wherever they are required. These cuttings are of great interest to the geologist, from the beautiful illustrations which they afford of that extreme irregularity of lamination which is characteristic of wind-drifts. Not only the country roads, but also the streets of the towns abound in these beautiful and instructive sections. Fine exhibitions of this same structure are to be seen in the natural sections afforded by the cliffs and pinnacles of the shore. The characteristic structure of the drift-rock is shown in plates III and IV.

The height of these accumulations of wind-blown sands is certainly remarkable. The highest hills on the islands attain an altitude of about 250 feet; and, since no rock of marine formation has been observed at an elevation of more than about 15 feet, it is evident that nearly the whole elevation of these hills must be due to the accumulated sand-drifts. Sand-drifts, however, of such extraordinary altitudes, though exceptional, are by no means unparalleled. Prof. W. C. Kerr, State Geologist of North Carolina, informs me that sand-hills more than 100 feet in height occur along the coast of that State. Dunes of even greater altitude than those in Bermuda occur on the coast of Gascony and near Cape Verd.*

In one respect, it seems to me, calcareous sands are better adapted than silicious ones for the formation of hills of great height: viz., the comparative solubility of the material, producing a more rapid consolidation by the cementing of the grains. At times when the direction of the wind is unfavorable to the increase of a sand-hill, in a region of variable winds, the tendency will be to reduce the height by removal of the sands from the summit. If the sand has already become partly consolidated, the loss from this cause will be much lessened.

MOVEMENTS OF ELEVATION AND SUBSIDENCE.

The facts which have been already detailed in regard to the distribution of the various kinds of rock, and other facts which will presently be referred to, afford clear evidence as to changes of level which the islands have undergone. The occurrence of beach-rock above the water-level, as noticed at several localities, is of course unquestionable proof of elevation. Proofs of subsidence are equally clear. The relation of the beach-rock and drift-rock at Devonshire Bay and various other localities along the south shore is evidence of subsidence. The cliff of drift-rock which in these localities rises immediately back of the narrow platform

* The Ocean, Atmosphere, and Life. By Élisée Reclus. New York, 1873. p. 195.

of beach-rock, is shown by its steep landward dip to be the landward side of a dune, whose seaward slope has been removed by erosion. The dip of the laminae of sand on the seaward face of a dune is, of course, seaward. If we conceive the seaward face of the dune to be restored, it would certainly in some localities extend beyond the narrow shore platform into the area now covered by the sea. It is evident, then, that the drift-rock of these cliffs on the south shore was formed at a time when the islands stood at a higher level than at present. It is easy to see the reason why the exposures of beach-rock should be much more frequent and extensive on the south shore than on the north, in the fact of the vastly greater erosive action of the sea on the south shore. The south shore receives the full dash of the waves of the Atlantic, while the north shore is acted upon only by the lighter waves raised in the great lagoon between the shore and the north reef. Another proof of subsidence is seen in the occurrence of caves with floors of stalagmite below the water level, and with stalactites whose tips are immersed in the seawater.* About the year 1870 "submarine blastings were carried on at the entrance of Hamilton Harbor, and at a depth of over 6 fathoms a cavern was broken into which contained stalactites and red earth."† In the excavations made somewhat later for the lodgment of the immense floating dock at the Dockyard on Ireland Island, 46 feet below the water-level was found a stratum of "red earth," 2 feet in thickness, containing remains of cedar trees. This stratum was underlain by a stratum, 4 feet thick, of hard calcareous sand-rock, containing land snails. J. Matthew Jones has called attention to the fact that an elevation equal to the subsidence indicated by the phenomena observed in the excavations at the Dockyard would lay bare the whole elliptical area inclosed by the outer reef.‡

The series of movements required to account for the main features of Bermudian geology seems to be the following: 1. A subsidence, in which the original nucleus of the islands disappeared beneath the sea, the characteristic atoll form was produced, and the now elevated beach-rock was deposited. 2. An elevation, in which the great lagoon and the various minor lagoons were converted into dry land, and the vast accumulations of wind-blown sand were formed, which now constitute the most striking peculiarity of the islands. 3. A subsidence, in which

* An elegant description of one of these beautiful caverns may be found in Thomson, *op. cit.*, Vol. I., pp. 304, 305.

† Jones, Recent Observations in the Bermudas: in *Nature*, Vol. VI., p. 262.

‡ Recent Observations in the Bermudas.



Rock pinnacle near the shore of IRELAND ISLAND, Bermuda.



the soft drift-rock around the shores suffered extensive marine erosion, and the shore platform and cliffs already described were formed.

On this hypothesis, the peculiarities of Bermuda mentioned by Darwin as rendering its atoll character at least doubtful,* admit of ready explanation. The absence of the usual horizontal reef-platform, and the gradual shoaling of the water for a mile or more around the islands, may be accounted for by the supposition that the last subsidence was too rapid and too recent to allow the growth of the reef into its usual and typical form.† The original atoll character has, indeed, been greatly modified by the subsequent changes; and the gradually sloping bottom for some distance from the shore presents, instead of the typical horizontal reef-platform, a plane of marine denudation formed by the rapid erosion of the soft calcareous sand-rock during the progressive subsidence. Dana has shown that a subsidence too rapid for the growth of the reef to keep pace with it may lead to the formation of narrow fringing reefs, producing thus an effect which may counterfeit the effects of elevation.‡ Darwin is inclined to regard the fringing reefs on the south shore of Bermuda as evidence of recent elevation;§ but I believe all the facts taken together are far more satisfactorily explained on the hypothesis that the latest movement has been one of subsidence. The extraordinary size and elevation of Bermuda, as compared with other atolls, is accounted for by the vast accumulation of drift-sand during a period of elevation. Darwin, indeed, admits that the probable *Æolian* formation of most of the Bermudian rock renders the unusual height of the islands immaterial as an objection to their atoll character.||

The difference in the amount of dry land between the northern and southern sides of the ellipse is doubtless due, as suggested by Dana,¶ in part to the prevailing southerly winds, the windward side of the atoll being the more favorable both for the growth of the reef proper and for the accumulation of beach and drift sand-rock; and partly to differences in the configuration of the lands around which the reefs were formed.

It is a profound and comprehensive suggestion of Professor Dana

* Coral Reefs, p. 264.

† For estimates illustrative of the extreme slowness of the growth of coral reefs, see Dana, *Corals and Coral Islands*, pp. 249-254.

‡ Notes on the new edition of Mr. Darwin's work on the *Structure and Distribution of Coral Reefs: in Nature*, Vol. X., pp. 403, 409.

§ Coral Reefs, p. 265.

|| Coral Reefs, p. 265.

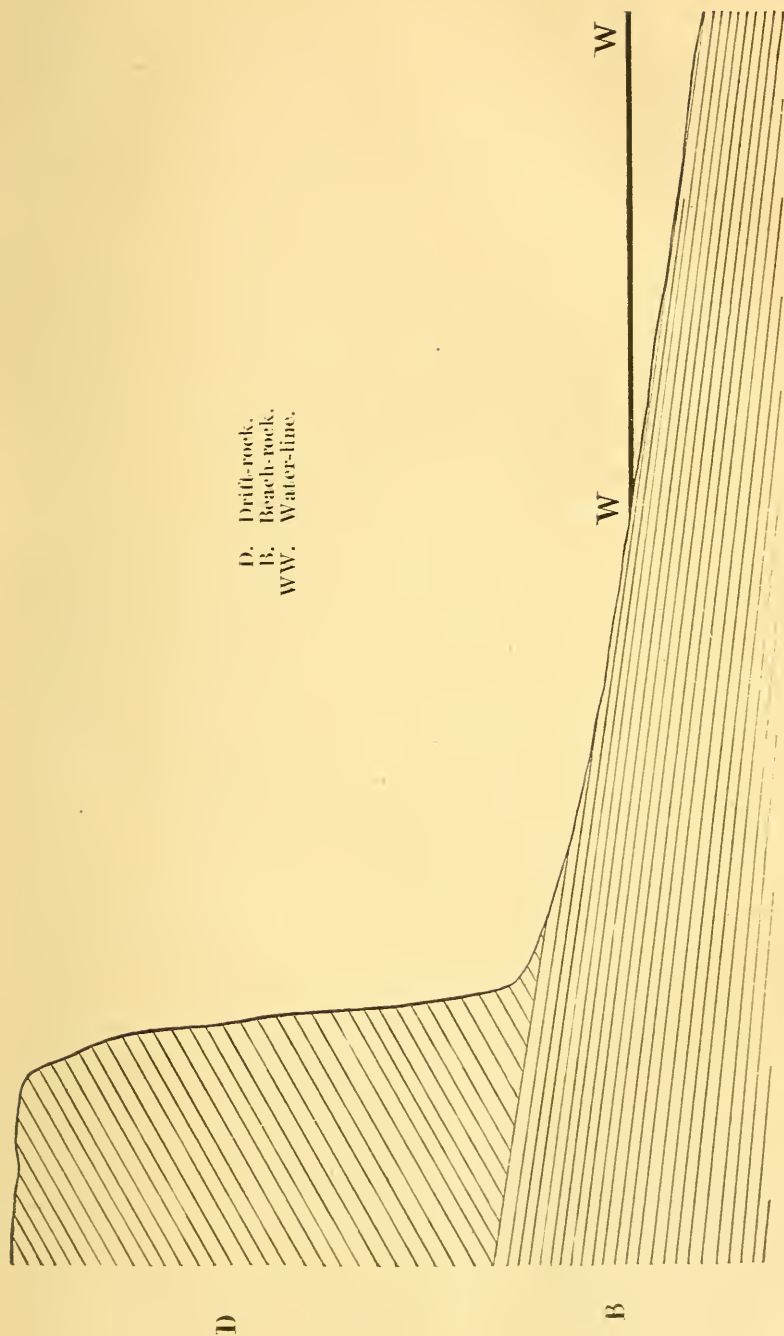
¶ *Corals and Coral Islands*, p. 221.

that the great oceanic subsidence recorded by the coral islands of tropical seas was the counterpart of the great elevation of the continental lands in the Glacial Period.* It is not improbably a legitimate following out of this suggestion to recognize, in the three great movements which are indicated for at least a part of the North Atlantic basin by the geological phenomena of Bermuda, the counterparts of the three great movements of the North American continent which have characterized in American geology the epochs of the Quaternary Age. The great subsidence in which the Bermudian atoll was formed, would then be recognized as correlative with the Glacial elevation of the continent. The epoch of elevation in which the Bermudian lagoon was converted into dry land, would correspond with the Champlain subsidence of the continent. And the final subsidence, of which Bermudian geology affords evidence so manifold, would correspond with the re-elevation of the continent which marked the transition to the Terrace or Recent Epoch.

While we may reasonably conclude that Bermuda, in common doubtless with an area of the North Atlantic of very considerable extent, has undergone these comprehensive movements, it would be strange if there had not occurred at least locally minor oscillations. Such oscillations may possibly be indicated by the stones reported by Nelson as occurring in the layers of "red earth" in Ireland Island.† His statement, however, is somewhat indefinite. At one locality on the south shore, a short distance west of Tucker's Town, I observed a hard layer of rock containing marine shells immediately overlying a soft layer containing land shells. The clearest evidence, however, of repeated oscillations of level is afforded by a remarkable locality on the north shore of Stock's Point. The rock which has been quarried there, and which now appears in the base of the bluff, is a very hard rock of subcrystalline texture and of ferruginous color. It shows vestiges of irregular lamination, and contains fossil *Helices* and no marine fossils. It is undoubtedly a drift-rock, like that at Paynter's Vale. The upper surface of this rock is exceedingly irregular, giving evidence of much sub-aerial erosion preceding the deposition of the overlying strata. It is overlain by a remarkable conglomerate, evidently a beach-rock, containing fragments of the underlying hardened drift-rock, peculiar ferruginous nodules, compact lumps of "red earth," and pretty large marine

* Corals and Coral Islands, pp. 366-372.

† *Op. cit.*, p. 118.



D, Drift-rock,
B, Beach-rock,
WW, Water-line.

Section illustrating relation of beach-rock and drift-rock.

shells. The upper surface of this conglomerate, unlike its lower surface, is quite regular—the usual plane of marine deposition. This conglomerate is overlain in places by a stratum of sand, like that observed at Devonshire Bay, containing shells of land snails in its uppermost layers. Above this sand, where the sand is present, in other places resting immediately upon the conglomerate, is the ordinary drift-rock.

HAS BERMUDA SUBSIDED WITHIN HISTORIC TIMES?

Assuming that the last movement of subsidence has occurred in times geologically very recent, the question arises whether that subsidence has occurred within historic times. The affirmative of this question is held by General Lefroy in his interesting and valuable work on the early history of Bermuda.* Mr. J. Matthew Jones coincides with this view.† This opinion is supported chiefly by three passages from early writers, which I propose to examine in chronological order.

The earliest is from Gonzalo Ferdinando de Oviedo, who visited the islands about the year 1515.‡ It reads as follows: “In the yeere 1515, when I came first to enforme your maiestie of the state of things in India, and was the yeere following in Flanders, in the time of your most fortunate successe in these your kingdoms of Arragon and Castile, whereas at that voyage I sayled above the Iland Bermuda, otherwise called Garza, being the furthest of all the Ilands that are found at this day in the world, and arriuing there at the depth of eight yards of water, and distant from the Land as farre as the shot of a piece of Ordinance, I determined to send some of the ship to Land, as well to make search of such things as were there, as also to leave in the Iland certaine Hogs for increase. But the time not seruing my purpose by reason of contrarie winde, I could bring my ship no neerer the Iland,

* Memorials of the Discovery and Early Settlement of the Bermudas or Somers Islands, 1515–1685. By Major-General J. H. Lefroy. 2 vols., London, 1877, '79.

† Recent Observations in the Bermudas.

‡ The extract is quoted by General Lefroy (*op. cit.*, vol. I., pp. 2, 3) from an early English version contained in a work entitled as follows: “The history of Trauayle in the West and East Indies and other countreys lying eyther way towards the fruitfull and riche Moluccaes, as Mosconia, Persia, Arabia, Syria, Ægypte, Ethiopia, Guinea, China in Cathayo and Giapan. With a discourse of the North-West Passage. Gathered in parte and done into Englyshe by Richard Eden. London, 1577.” The same version of Oviedo's narrative, under the title, “Extracts of Gonzalo Ferdinando de Oviedo his Summarie and Generall Historie of the Indies,” appears in Purchas his Pilgrimes, Part 3, pp. 971–1000, London, 1625. The passage here cited may be found in Purchas, p. 989. The original Spanish of the same passage is quoted in Lefroy, *op. cit.*, Vol. I., p. 677.

being twelue leagues in length, and sixe in breadth, and about thirtie in circuit, lying in the three and thirtieth degree of the North side. While I remayned here, I saw a strife and combat betweene these flying-fishes, and the fishes named giltheads, and the fowles called sea mewes, and cormorants, which surely seemed unto one a thing of as great pleasure and solace as could be deuised."

On this passage, General Lefroy comments as follows: * "The terms of this narrative imply a stay of some slight duration, which is to be inferred also from the approximation with which the dimensions of the group are fixed; and it is very unlikely that none of the party landed. * * * It is probable that the purpose he was prevented from fulfilling was that of landing hogs, not that of communicating with the shore." It seems to me, on the contrary, a more likely inference from the language of Oviedo, that he was altogether prevented from landing. It would not require a sojourn on land to witness a fight between flying-fishes and cormorants—the only incident which he refers to in connection with his visit to the islands. Certainly every circumstance indicates that Oviedo's estimate of the size of the archipelago must be taken as merely a rough guess, and no inference can be drawn from the slight excess of that estimate over the present actual dimensions.

The chief evidence relied upon by General Lefroy to support the belief of a subsidence within historic times is the testimony of Henry May, an English sailor in a French vessel, who was shipwrecked on the islands in December, 1593, and remained there until April, 1594.† The statements in May's narrative bearing upon the subject in question are as follows: "We made account at the first that we were cast away hard by the shore, being hie cliffs, but we found ourselues seuen leagues off, but with our boat and a raft, which we had made and towed at our boats sterne, we were saued some 26 of us. * * * We rowed all the day until an hour or two before night yer we could come on land, towing the raft with the boat. * * * This island is diuided all into broken islands; and the greatest part I was upon, which might be some four or five miles long, and two miles and a halfe ouer, being all woods, as cedar and other timber, but cedar is the chiefest."

General Lefroy adds to this narrative the following comments:‡ "There

* *Op. cit.*, Vol. I., p. 3.

† Hakluyt's Collection of the early Voyages, Travels, and Discoveries, of the English Nation. New edition, with additions. 5 vols. London, 1809-12. Vol. IV., pp. 55, 56. May's narrative is quoted in Lefroy, *op. cit.*, Vol. I., pp. 7-9.

‡ *Op. cit.*, pp. 9, 10.

is nothing more remarkable in this narrative than the statement that they made account at the first that they were cast away hard by the shore, being high cliffs, whereas they found themselves seven leagues off. It is a positive proof that the north-west reefs, only a few points of which are now above water at the lowest spring tide, were then some feet above it. The expression high cliffs must be interpreted by the circumstance of seamen in a small boat approaching a dangerous shore, with a heavy swell on, rendering it dangerous and difficult to land. But if they were only 10 feet high, the amount of subsidence in less than three centuries, shown by their present submergence, is a most significant geological fact; and Henry May has rendered an invaluable service by mentioning the circumstance. The map in Purchas, published 1625, confirms it. It shows three distinct islets, that have now disappeared, along the line of the northern reefs. The North Rock of Bermuda, 14 feet high, and some smaller rocks near it, are all that remain to attest the accuracy of these early descriptions." The statements of May appear to me rather to warrant exactly the contrary inference. If the northern reef formed then a line of cliff nearly or quite continuous, I am unable to understand how he could have supposed himself hard by the shore when really several leagues from it. But, on the supposition that the vessel struck near some islet or group of islets like North Rock, the account becomes perfectly intelligible. The rocky islet could easily have been mistaken in the storm for a line of cliff, and the mistake would speedily become obvious on starting to row to the supposed shore. The 7 leagues of distance is, of course, the exaggerated estimate of men who were rowing a heavy-laden boat, with a raft in tow, on a stormy sea. That there may have been several islets scattered along the line of the north reef, which have now succumbed to the action of the waves, is on all accounts exceedingly probable. May's statement that the island is divided into broken islands, and his estimate of the dimensions of the island on which he found himself, and which he supposed to be the principal one of the group, though the description is not sufficiently definite to afford any very reliable conclusions, certainly favor the belief that the land was then not appreciably higher than at present. An elevation which would convert the north reef into a continuous line of cliff, would very seriously modify the broken character of the southern side of the atoll, connecting most of the islets by continuous dry land.

The last notice supposed to indicate a subsidence within historic

times is from John Smith's History of Virginia.* In an enumeration of the birds found in Bermuda occurs the expression: "Very many crows, which since this plantation are killed, the rest fled or seldom seen, except in the most uninhabited places, from whence they are observed to take their flight about sunset, directing their course towards the north-west, which makes many conjecture there are some more islands not far off that way."† The statement is too indefinite to justify any very positive conclusions. If we accept it as indicating the existence of some dry land in the position of the north reef, it may perhaps be sufficiently accounted for by the supposition already suggested: namely, that there may have been a number of small islets which have since been degraded to the water-level by the erosion of the waves. Certainly the statement does not justify a belief in the recent subsidence of the islands, in opposition to the evidence now to be presented.

The earliest descriptions of Bermuda which are sufficiently accurate and detailed to admit of intelligent comparison with the present condition of the islands, date from the time of the shipwreck of Sir Thomas Gates and Sir George Somers in 1609. The following extracts from these descriptions will show that at that time the size and form of the islands and the depth of water within the reef were essentially the same as at present. The statement of the depth of the water seems to me perfectly conclusive against the theory of any considerable subsidence within the last three centuries.

The first of these extracts is from the narrative of William Strachy.‡ "The Bermudas bee broken Ilands, fivie hundred of them in manner of an Archipelagus (at least if you may call them all Ilands that lie, how little soeuer into the sea, and by themselues) of small compasse, some larger yet then other, as time and the Sea hath wonne from them, and eaten his passage through, and all now lying in the figure of a Croissant, within the circuit of sixe or seuen leagues at the most, albeit at first it is said of them that they were thirteene or fourteene leagues; and more in longitude as I have heard. For no greater distance is it

* The General History of Virginia, New England, and the Summer Isles. By Capt. John Smith. London, 1624. The work is reprinted in A General Collection of Voyages and Travels in all parts of the World. By John Pinkerton. London, 1803-'14. Vol. XIII., pp. 1-253.

† Pinkerton, *op. cit.*, Vol. XIII., p. 173.

‡ A true repertory of the Wracke, and redemption of Sir Thomas Gates Knight; upon, and from the Ilands of the Bermudas: * * * written by William Strachy, Esquire. The narrative is contained in Purchas, Part 4, pp. 1734-'53. Copious extracts are given in Lefroy, *op. cit.*, Vol. I., pp. 52-54.

from the Northwest point to Gates his Bay, as by this Map your Ladyship may see, in which Sir George Summers, who coasted in his boat about them all, tooke great care to expresse the same exactly and full, and made his draught perfect for all good occasions, and the benefit of such, who either in distresse might be brought upon them, or make saile this way. It should seeme by the testimony of Gonzalus Ferdinandus Oviedus, in his Booke intituled, The Summary or Abridgement of his generall History of the West Indies, written to the Emperor Charles the Fift, that they haue been indeed of greater compasse (and I easily beleue it) than they are now, who thus saith [here follows the extract from Oviedo, as above given, except that, by a mistake of copyist or printer, the breadth of the group is given as sixteen leagues, instead of six]. True it is, the maine Iland, or greatest of them now, may be some sixteene miles in length East North-East, and West South-West the longest part of it, standing in thirtie two degrees and twentie minutes, in which is a great Bay on the North side, in the North-west end, and many broken Ilands in that Sound or Bay, and a little round Iland at the South-west end.”*

The second extract is from the narrative of another member of the expedition.† “This Iland, I meane the maine Iland, with all the broken Ilands adiacent, are made in the forme of a halfe Moone, but a little more rounder, and divided into many broken Ilands, and there are many good harbors in it, but we could find but one especiall place to goe in, or rather to goe out from it, which was not altogether free from some Danger, there there is three Fathoms water at the entrance thereof, but within, six, seauen, or eight Fathoms at the least, where you may safely lie Land-locked, from the daunger of all Winds and Weathers, and moore to the trees.”‡

To me these descriptions appear to justify a very positive conclusion that there has been no considerable subsidence since 1609; and, of course, all geological probabilities are against so rapid a subsidence as

* Purchas, *op. cit.*, Part 4, p. 1738.

† A discovery of the Barmudas, otherwise called the Ile of Diuels, by Sir Thomas Gates, Sir George Sommers, and Captayne Newport, with Diuers others. Sil. Jourdan. A reprint of this narrative bears the title: A plaine Description of the Barmudas, now called Sommer Ilands. With the manner of their Discouerie Anno 1609, by the shipwrack and admirable deliuerance of Sir Thomas Gates, and Sir George Sommers. London, 1613. Hakluyt, *op. cit.*, Vol. V., pp. 551-8. Tracts and other papers relating principally to the Origin, Settlement, and Progress of the Colonies in North America. Collected by Peter Force. Vol. III., No. 3. Lefroy, *op. cit.*, Vol. I., pp. 14-21.

‡ Hakluyt, *op. cit.*, Vol. V., p. 557. Force, *op. cit.*, Vol. III., No. 3, pp. 13, 14.

would be required to convert the north side of the atoll from a high cliff to a sunken reef in the interval between May's shipwreck in 1593 and Somers' in 1609, or to diminish considerably the area of the archipelago in the century succeeding Oviedo's voyage in 1515. A conclusion so improbable is certainly not to be adopted on evidence so indefinite or ambiguous as has been gathered from the narratives of Oviedo and May. The belief that the level of the islands in the time of John Smith was higher than at present is utterly out of the question. The opinion advocated in this paper finds additional confirmation in the Map by Richard Norwood, in 1663.* That map is an accurate delineation of the islands in their present condition, and renders it certain that within the last two hundred years no considerable subsidence has taken place.

EROSION.

One of the most interesting incidental subjects of study for a geologist in Bermuda is the immense erosion which has taken place. The softness of most of the drift-rock, and the solubility of calcium carbonate in rain-water, combine to produce an exceedingly rapid erosion, even though the powerful agency of frost is wanting. Many of the most picturesque features of Bermudian scenery are due to this erosion. The shore cliffs in many localities are carved into the most picturesque pinnacles, in whose endless variety of form the eye may find perpetual delight. Another result of erosion is the formation of innumerable caves, ranging in size from exquisite miniature grottoes to extensive caverns. One of these beautiful miniature caves I observed at Paynter's Vale. It had been laid open by the removal of the stone in quarrying. Its horizontal diameter was about 5 feet, its height in the middle about 2 feet. Pygmy stalagmites rose from the floor, and pygmy stalactites depended from the roof. In the peripheral parts of the little cavern the stalactites and stalagmites united in many cases to form little columns. Many of the larger caves are of exceeding beauty; but it is unnecessary to give any detailed description of them, as the phenomena are of course those which occur in all limestone caverns. A curious feature which the traveler meets here and there in Bermuda is a deep hollow with walls nearly vertical, or in places even overhanging. One may be walking over a nearly level plain, and suddenly find himself on the edge of a precipice looking down into a

*The curious history of Norwood's Map is given in Lefroy, *op. cit.*, Vol. I., preface. A copy of the map itself faces p. 645 of Vol. II.



Rocks on the south shore of Bermuda.

deep and wide gulf. These hollows are simply caves whose roofs have been eroded by the mechanical and chemical action of water, until, too weak to support themselves, they have caved in. On the walls of these unroofed caves beautiful stalactites may be seen half enveloped with velvety mosses and feathery ferns—a strangely beautiful combination of the adornments of the underworld with those of the world of daylight. In other cases the process of erosion has continued still further, so that the sides of the cave, as well as the roof, have been entirely removed, and nothing is left to mark the site of the former cave but a floor of crystalline stalagmite. Near Walsingham on the Main Island, and near Mullet Bay on St. Georges, I observed considerable areas where the coarsely crystalline calcite forming the surface rock is unquestionably a stalagmite floor—the only memorial of a former cave.

THE “RED EARTH.”

The so-called “red earth” bears striking testimony to the amount of erosion which the islands have undergone. The usual superficial soil of the islands is a clayey earth, sometimes of a deep brick-red color, sometimes showing various shades intermediate between this deep red and the white or cream-color of the underlying rock. The material is occasionally somewhat firmly consolidated, but usually quite soft and earthy. It varies much in depth, forming deep pockets in some places, while in other places the white rocks are bare. It often occurs in cracks and cavities in the rocks. Where any considerable thickness of the drift-rock is exposed in a section, as at the extensive quarries on Ireland Island, one or more layers of the same “red earth” may generally be observed extending nearly horizontally at intervals through the rock. Various unsatisfactory explanations of the origin and nature of this “red earth” have been given. Jones formerly believed it to be “composed of decayed vegetable matter”;^{*} and this is indeed the common opinion of the inhabitants of Bermuda. Nelson conjectured that it was largely derived from the excrements of bats and birds.[†] The true explanation of its origin is undoubtedly that given by Thomson, as follows: “The coral-sand, like the mass of skeletons of surface animals accumulated at the bottom of the ocean, does not consist of carbonate of lime alone. It contains about 1 per cent. of other inorganic

^{*} On the Geological Features of the Bermudas: in Proceedings and Transactions of the Nova Scotian Institute of Natural Science, Vol. I., Part IV., Art. II., 1867, p. 21.

[†] Dana, Corals and Coral Islands, p. 391. The citation is from a paper on the Bahamas, in Quarterly Journal of the Geological Society of London, 1853.

substances, chiefly peroxide of iron and alumina, silica, and some earthy phosphates. Now these substances are to a very small degree soluble in water charged with carbonic acid; consequently, after the gradual removal of the lime, a certain sediment, a certain ash, as it were, is left behind. One per cent. seems a very small proportion, but we must remember that it represents one ton in every hundred tons of material removed by the action of water and of the atmosphere; and the evidences of denudation on a large scale are everywhere so marked, that, even were some portion of this 1 per cent. residue further altered and washed away, enough might still be left to account fully for the whole of the red earth.* Assuming the "red earth" to be the insoluble residue left by the solution of the major part of the calcium carbonate of the coral rocks, it should be observed that its materials doubtless have the same twofold origin which has been recognized in the case of the somewhat analogous red clays of the deeper parts of the ocean bottom.† They are doubtless in part derived from the minute quantity of non-calcareous mineral matter existing in the corals, shells, and other calcareous skeletons of marine animals and plants; in part from the decomposition of volcanic minerals, which are continually being transported in various ways to all oceanic islands. Analyses of samples of the "red earth" are quoted by Thomson‡ from a "Report from Professor Abel, F. R. S., to H. E. General Lefroy, C. B., F. R. S., on the Character and Composition of Samples of Soil from Bermudas."

PHENOMENA RESULTING FROM UNEQUAL HARDENING OF THE LIMESTONE.

A number of interesting phenomena result from the unequal hardening of the sand-rock where vegetable stems or roots or other accidents have determined the location of channels for the percolating waters. On the weathered surface of cliffs and banks of the drift-rock may often be observed hard bodies somewhat projecting, consisting of a more firmly consolidated sand-rock, having the form of slender cylinders irregularly branching, the main trunks being generally nearly vertical. These stems may generally be seen to be tubular, and in the slender cavity may generally be found more or less of woody fiber. These bodies have much the form and aspect of the "branched bodies" observed by Darwin at King George's Sound on the south-west coast of Australia, and at the Cape of

* Thomson, *op. cit.*, Vol. I., pp. 294, 295.

† Thomson, *op. cit.*, Vol. I., pp. 215-218; Vol. II., pp. 255, 256.

‡ *Op. cit.*, Vol. I., pp. 325, 326.

Good Hope*, though differing from them in some respects, particularly in the very general presence of woody fiber in the center. Darwin states that the "branched bodies" at King George's Sound have "the central parts filled either with friable calcareous matter, or with a substalagmitic variety; this central part is also frequently penetrated by linear crevices, sometimes, though rarely, containing a trace of woody matter." In the similar bodies found at the Cape of Good Hope, he says, the "centers are often filled with black carbonaceous matter." Darwin's theory of the origin of these bodies is that they were "formed by fine calcareous matter being washed into the casts or cavities left by the decay of branches and roots of thickets buried under drifted sand."† The more distinctly tubular character of the Bermudian specimens, and the very common presence of a core of woody matter, seem to point to a slightly different mode of formation; and I believe the true explanation of the origin of the Bermudian "branched bodies" is that given by Jones. He believes that they have been formed by percolating waters, which would naturally follow in their descent the channels formed by underground stems and roots, cementing the grains of sand into tubes of harder rock inclosing the stems and roots.‡ Both theories assume the burial of the vegetation beneath drifted sand. But, while Darwin considers the bodies in question as casts formed after the decomposition of the stems and roots, Jones considers them as having been formed by the cementing of the sand around stems and roots as yet undecomposed. Closely analogous to these "branched bodies" is the sort of stalagmitic net-work formed in some localities around the roots and stems of smaller plants.

Essentially analogous, also, are probably the so-called "palmetto stumps." These have been described by Nelson,§ Jones,|| and Thomson.¶ They appear generally as shallow, cup-shaped or saucer-shaped cavities, a few inches in diameter, the rim somewhat elevated above the general surface of the ground, the bottom evenly rounded and pitted with small depressions. The surface of these cups is quite hard; and the rock

* Geological Observations on the Volcanic Islands and parts of South America visited during the Voyage of H. M. S. Beagle. Second edition. London, 1876. pp. 161-165. Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H. M. S. Beagle round the World. New edition. New York, 1875. p. 450.

† Geological Observations, p. 163.

‡ Geological Features of the Bermudas, p. 24.

§ *Op. cit.*, pp. 115, 116.

|| Geological Features of the Bermudas, p. 21.

¶ *Op. cit.*, Vol. I., pp. 306-311.

beneath for some inches in depth, though less hard than the superficial crust, is more firmly consolidated than the surrounding rock. The objects accordingly appear, when the surrounding rock is removed by weathering or otherwise, as irregular cylinders. It has often been crudely supposed that these cylinders are petrifications or casts of the trunks of the palmetto; but this is certainly erroneous. I believe, however, that this error is but a misconception of the truth. The base of the palmetto stem is convex, with numerous small roots radiating from its surface. Its form is the counterpart of the shallow cup, pitted with little depressions, which is the characteristic feature of the bodies in question. The true explanation of the formation of these bodies appears to be simply this: the rain-water trickles down around the convex base of the palmetto stem, and thence follows the little radiating roots. As in the other cases already discussed, the course of the waters is marked by a more perfect cementing of the grains of calcareous sand, giving the rock in those parts a sub-stalagmitic character. When the tree finally dies, and drops out of its socket, there is left a saucer-shaped cavity, lined by a sub-stalagmitic crust, and an irregular cylinder of somewhat hardened rock beneath it. Sir Wyville Thomson combats the idea of the organic origin of these bodies, and calls attention to the frequent irregularity of their form. He tells us that a perfect series of gradations may be traced from the regular circular form ("the most characteristic, and probably by far the most common")* to forms so irregular that their organic origin is entirely out of the question. Now in maintaining that the common and typical sort of these bodies are produced by the rain-waters following the course determined for them by the stem of the palmetto, I by no means deny that by accidents of a totally different sort special channels for the percolating waters may be determined, and "calcareous concretions" produced of all sorts of irregular forms. Moreover, it would be the most natural thing in the world that some of the concretions whose form is determined by other conditions should considerably resemble some of the least regular and perfect of those formed in the way I have explained. Admitting that all the "concretions," regular and irregular, are the result of the unequal hardening of the stone by the cementing action of water, the regular saucer-shaped cavities already described are so frequent and so characteristic that it is worth while to inquire what is the special condition which has hardened the rock in precisely that form. That ques-

* Thomson, *op. cit.*, Vol. I., p. 308.

tion, I believe, is satisfactorily answered in the explanation I have given. Sir Wyville Thomson's explanation I transcribe entire, lest I should do injustice in criticizing a passage which I do not quite understand. "In the caves in the limestone, owing to a thread of water having found its way in a particular direction through the porous stone of the roof, a drop falls age after age on one spot on the cave-floor accurately directed by the stalactite which it is all the time creating. The water contains a certain proportion of carbonate of lime, which is deposited as stalagmite as the water evaporates, and thus a ring-like crust is produced at a little distance from the spot where the drop falls. When a ring is once formed, it limits the spread of the drop, and determines the position of the wall bounding the little pool made by the drop. The floor of the cave gradually rises by the accumulation of sand and travertine, and with it rise the walls and floor of the cup by the deposit of successive layers of stalagmite; and the stalagmite produced by the drop percolating into the limestone of the floor hardens it still further, but in this peculiar symmetrical way."* On this explanation I will only remark that stalagmites deeply and broadly concave on the top, and cave-floors rising by accumulation of sand and travertine (the material having the structure of drift sand-rock) so as to keep nearly on a level with the growing bosses of stalagmite, are phenomena never observed, to my knowledge, in Bermuda or elsewhere.

NON-CALCAREOUS ROCKS AND MINERALS.

While the only indigenous rocks in Bermuda are the various varieties of limestone, the "red earth," and the peat or muck of the bogs, grains and nodules of various minerals, mostly volcanic in origin, occur mingled with the coral sands, and blocks of various rocks are liable to be occasionally brought in the roots of drifted trees. These accidental arrivals are common to all oceanic islands.

John Murray, F. R. S. E., in a letter to General Sir J. H. Lefroy (a copy of which has been furnished me by the kindness of J. Matthew Jones, F. L. S.), names the following minerals as occurring in samples of Bermuda sands examined by himself: menaccanite, magnetite, augite, olivine, hornblende, sanidin and other feldspars, mica, and perhaps quartz. Mr. Murray notes the fact that the "red earth," on treatment with acids, leaves a residue much resembling the "titaniferous sands" found at various localities along the shore. He suggests that the volcanic minerals of the "titaniferous sands" may have been in

* *Op. cit.*, Vol. I., pp. 303, 309.

great measure washed out by rains from the "red earth." The following interesting passage is quoted from the letter above mentioned: "I think it most probable that in the far past there would be a great quantity of this sand on the shores of the then Bermuda. This, however, as the island sank, and the coral grew, would become less and less in proportion to the coral sand. Some of it would, one may be sure, always be carried up by the wind along with the coral sand, and these grains would accumulate in the 'red earth,' which one must regard as the residue after the removal of the calcareous matter. In this way, much of this volcanic sand may have belonged to the original Bermuda. Much of it, I cannot but think, has been carried to the island by pumice stone. Volcanic and other dust carried by the winds will doubtless have contributed to the mineral particles we now find in the rock of Bermuda." The considerable abundance of menaccanite, magnetite, augite, olivine, and other volcanic minerals in the sands at various localities may be due to the fact that the material has been repeatedly worked over—now blown up in sand-dunes, now washed down to the shores by the rains. Thus the comparatively insoluble grains would be concentrated and reconcentrated by the removal of the more soluble calcium carbonate. Whether these volcanic grains are in part indigenous, as Mr. Murray supposes, or have all been transported to the island in the form of pumice or otherwise, we might reasonably expect that they would now occur here and there in considerable abundance as the result of this process of concentration.

Nelson reports the occurrence of "small pieces of oxide of iron, of very questionable origin; menaccanite, found near the ferry between St. George's Island and Bermuda or Main Island; arragonite; and a minute quantity of manganese in the red earth."* Among the nodules of oxide of iron I have recognized both hematite and limonite. J. Matthew Jones has noticed the occasional occurrence of pieces of trap, doubtless brought among the roots of drifted trees.† George W. Hawes, Ph. D., late of the United States National Museum, has noticed the occurrence of pebbles of a variety of kinds of rocks. In a letter to me, a few weeks before his death, he wrote concerning them as follows: "One is a beautiful augite porphyry with large crystals finely formed of augite, and most of them are eruptive rocks; but I have two that are plainly silicious, apparently metamorphic rocks. I have found two quartz (flint) pebbles, small in size, and one I took out of the inside of a sponge."

* *Op. cit.*, p. 105.† *Geological Features of the Bermudas*, p. 22.

FOSSILS.

Fossils of recognizable character are found chiefly in the comparatively scanty deposits of beach-rock. The drift-rock, however, contains in abundance shells of several species of land snails, the most common being *Zonites bermudensis* and the perhaps specifically distinct variety *nelsonii*, *Helix microdonta*, and *Helix circumfirmata*. Among these it is noteworthy that *Zonites bermudensis* var. *nelsonii* no longer exists in a living state. The other three forms are still abundant residents of the islands. Shells of *Livona pica* are also abundant in the drift-rock, having doubtless been carried up from the water by "soldier" or hermit crabs. I have also observed bones of birds and fragments of the shells of crabs. The remains of marine shells and corals in the drift-rock are usually so finely comminuted as to be unrecognizable.

The beach-rock in several localities contains marine shells in great abundance and variety. Nelson appears to be not far out of the way in the statement that "almost every shell now known in the surrounding sea may be found in the rock."* I made no endeavor to make a complete collection of the fossils of the beach-rock. I append, however, a list of the shells which have been recognized among the specimens of rock which I collected to illustrate the geology of the islands. The list may be of some interest as indicating in general the most common species of fossils:

- Mytilus exustus*, Linn.,
- Pectunculus* ———,
- Barbatia domingensis*, Lam.,
- Lucina pennsylvanica*, Linn.,
- Chama macerophylla*, Chem.,
- Chama lingua-felis*, Reeve,
- Bulla media*, Linn.,
- Fissurella barbadensis*, Gmel.,
- Fissurella graeca*, Lam.,
- Livona pica*, Linn.,
- Nerita peloronta*, Linn.,
- Truncatella* ———,
- Vermetus lumbricalis*, Linn.,
- Tectarius muricatus*, Linn.,
- Cerithium versicolor*, C. B. Ad.,
- Cyphoma gibbosa*, Linn.,

* *Op. cit.*, p. 114.

Cypraea ———,
Trivia rotunda, Kien.,
Columbella mercatoria, Linn.,
Columbella cribraria, Lam.,
Olivella oryza, Lam.,
Nasa candei, d'Orb., var. *antillarum*.

For the preparation of the above list I am indebted to Henry L. Osborn, A. B., formerly assistant in Natural History in Wesleyan University. Besides the shells of mollusks, those of *Balanus* also occur. Fragments of coral admitting of specific identification appear to be rare, the fragile skeletons of the coral animals having generally been pretty thoroughly comminuted.



PART II.

THE BOTANY OF BERMUDA.

BY

General Sir JOHN HENRY LEFROY, F. R. S.

(GOVERNOR OF BERMUDA, 1872-1877.)

ATHENÆUM CLUB, LONDON.

THE BOTANY OF BERMUDA.

From the limited area of the Bermudas, which does not exceed 20 square miles; from their evenness of surface, which nowhere rises more than 250 feet above the sea; and from the uniformity of the soil, which is almost entirely derived from the disintegration of calcareous or coralline sand, the botanist would naturally expect a native vegetation of very little range or variety, and if he remembers their position on the eastern margin of the Florida Gulf Stream he will further expect a predominance of West Indian species among those that may exist. Both these inferences would be correct, but there are some other factors which have materially modified the result. This green oasis in the desert of Atlantic waters, so late discovered by man,* was for countless ages before that epoch, as it still is a resting place for birds in their migrations from the American continent. Man himself when he came found a soil of virgin fertility and a singularly genial climate, giving welcome alike to strangers from the north and from the south. Thus for nearly three centuries seeds and plants from the most distant parts of the world have been introduced by him, or have followed in his foot-steps and made themselves at home, until it is in many cases difficult to decide whether design or natural causes independent of human agency or mere accident have produced the assemblage we find.

For about eighty years Indian corn (*Zea mays*) and tobacco, both of them exhausting crops, were the staple products of Bermuda, varied chiefly by sweet potatoes (*Ipomœa Batatas*), and it is not improbable that the opinion which prevailed in the last century of a deterioration of the soil may have had some foundation, although the cause assigned, "the cutting down of pine and spreading cedar trees," can have had little to do with it. The cedar tree itself is the enemy of cultivation, and nothing valuable grows under its shade. Its roots run to astonishing

* About 1511.

distances, and, as every one knows who has tried to improve plantations in the neighborhood of cedar trees, they monopolize all the good soil they can reach.

"It is universally agreed," says Dr. Robertson, "that the nature of this (St. George's) and the other Bermuda Islands has undergone a surprising change for the worse since they were first discovered, the air being much more inclement, and the soil much more barren than formerly; this is ascribed to the cutting down of those fine spreading cedar trees for which the islands were famous, and which sheltered them from the blasts of the north wind at the same time that it protected the undergrowth of the delicate plants and herbs. In short, the Summer Islands are now far from being desirable spots; and their natural productions are but just sufficient for the support of the inhabitants, who, chiefly for that reason, perhaps, are temperate and lively to a proverb. * * * The Bermuda Islands, however, might still produce some valuable commodities were they properly cultivated; * * * their oranges are still valuable; their soil is also said to be excellent for the cultivation of vines."*

As the historian had never visited the islands, his opinion is only cited for the strong testimony he bears to the general opinion a century ago that they were barren. There is, in fact, but very little good soil among them; the element *silica* in particular, which enters so largely into the composition of most fertile soils, being very wanting; *potash* and *soda* present in very small quantities, and *iron*, in the form of oxide or peroxide, much in excess in the soils which are otherwise the best. The small number of deciduous trees, and the prevalence of the cedar (*Juniperus Bermudiana*), which contributes little to the soil, are also a source of poverty.

* Robertson's America, 1777, VI., p. 286.

The following table, extracted from an agricultural report drawn up by the writer in 1873, and based on analyses by Mr. F. A. Manning and others, gives a concise view of the mineral elements of the Bermuda soils:

TABLE I.—*Relative proportions of the component parts of Bermuda soils, omitting water.*

	White soil.		Red soils.							
	Manning.		Professor Bernays.	Professor Abel.	Mr. Manning.					
	No. 1, sand.	No. 2, mud.			No. 3.		No. 4.		No. 5.	
					Soluble.	Insoluble.	Soluble.	Insoluble.	Soluble.	Insoluble.
Water (not included)	0.316	18.134	18.7	42.57	16.231	.....	6.930	.....	23.20	.....
Organic substance	3.816	4.700	.....	.....	13.280	.....	16.260	.....	16.710	.....
Lime	52.47	51.400	.....	5.59	3.724	0.431	1.250	2.386	10.077	.....
Lime, carbonate of .....	.....	.....	4.31	.....	.....	.....	.....	.....	.....	.....
Lime, sulphate of .....	.....	.....	2.50	.....	.....	.....	.....	.....	.....	.....
Magnesia	1.686	0.756	.....	3.50	0.018	0.550	0.099	.....	0.199	0.217
Magnesia, carbonate of .....	.....	.....	3.32	.....	.....	.....	.....	.....	.....	.....
Alumina .....	.....	.....	.....	20.44	0.173	16.155	0.120	24.850	0.105	9.474
Sand and insoluble clay	0.050	0.047	.....	48.70	.....	47.380	.....	21.910	.....	40.670
Silica .....	.....	.....	45.74	.....	.....	.....	.....	.....	.....	.....
Oxide of iron and alumina	0.520	.....	43.67	.....	.....	.....	.....	.....	.....	.....
Oxide of iron .....	.....	0.213	.....	.....	.....	.....	.....	.....	.....	.....
Oxide of protoxide .....	.....	.....	.....	trace	.....	.....	.....	.....	.....	.....
Oxide of sesqui or peroxide .....	.....	.....	.....	13.29	0.047	14.580	0.362	30.880	0.046	12.840
Potash	0.064	0.088	.....	.....	.....	0.140	.....	0.169	.....	0.113
Soda	0.243	0.070	.....	.....	.....	0.007	.....	0.060	.....	0.033
Carbonic acid	42.866	42.580	.....	5.55	2.666	.....	0.836	.....	8.676	.....
Sulphuric acid	0.206	.....	.....	.....	trace	.....	0.065	.....	0.040	.....
Silicic acid .....	.....	.....	.....	.....	0.149	.....	0.037	.....	0.159	.....
Phosphoric acid	0.007	0.124	.....	2.93	.....	0.742	.....	0.676	.....	0.681
Chlorine	0.020	0.011	.....	.....	.....	.....	0.046	.....	.....	.....
Chlorides, phosphates, &c., not determined .....	.....	.....	1.06	.....	.....	.....	.....	.....	.....	.....
					20.058	79.945	19.075	80.931	36.012	64.030
	102.01	99.99	100.0	100.00	100.0		100.0		100.0	

Notwithstanding, however, this want of natural fertility due to the geological origin of the group, and to a cause, perhaps, remotely connected with the stormy character of the region, the abundance of rain and the genial temperature make up for many disadvantages. There appear to be few West India plants or fruits which could not be grown in the islands with a proper selection of localities. It is otherwise, however, as Dr. Rein has remarked* with many fruits belonging to northern temperate regions; many American species which on the continent descend to much lower latitude refuse to flourish or die out in Bermuda, not so much, probably, from the heat of the summer as from the

* Strawberries, grapes, figs, peaches, ripening in March and April, grow in Bermuda, but not the ordinary kernel and stone fruits.—Rein.

sustained high temperature of the winter, which is such that the temperature of the soil six inches below the surface was never found lower than $52^{\circ}.66$.

Frost is nearly, but not quite, unknown. There are but two well authenticated cases on record. On the 24th December, 1840, while frost was visible "in low situations, water in tubs was frozen to the thickness of half a crown."* On the 21st February, 1878, a thermometer on grass registered $28^{\circ}.2$. There is a tradition of snow, about 1811 or 1812;† a few flakes, indeed, fell at St. George's on the 4th March, 1874. On 20th February, 1872, the ground was in some places white with hail, which did not disappear for some hours. These facts are sufficient to show that the temperature of the air is subject to much greater extremes than are experienced at sea level within the tropics, although the vegetation partakes so largely of a tropical character.

Low temperatures occur most frequently in the month of March. During the years 1872-77 a thermometer on grass registered below 40° F., as follows:

In December 2 times, lowest $35^{\circ}.2$ in 1876.

In January 4 times, lowest $34^{\circ}.0$ in 1874.

In February 3 times, lowest $35^{\circ}.0$ in 1877.

In March 8 times, lowest $35^{\circ}.0$ in 1877.

Notwithstanding many years of observation, the data for determining the mean temperature of the air are imperfect. Observations have only been made at 9 or $9\frac{1}{2}$ a. m., and at 3 or $3\frac{1}{2}$ p. m., and the diurnal low for the several months is unknown. While the record was kept by the royal engineers, however, a monthly term day of hourly observation was observed, and from the days so recorded some approximation to the horary corrections might probably be derived, but I prefer to give the actual observations at those hours, subject to future reduction. To these are added in the subjoined table the mean temperature of the soil at 6 inches and 12 inches depth, which will have future value, the International Meteorological Congress held at Rome in April, 1879, having resolved to include for the future the temperature of the surface of the earth among the meteorological elements to be observed.

* Mr. J. L. Hurdis, in Jones' "Naturalist in Bermuda."

† Mr. John Harvey Darrell is the authority for this statement.

TABLE II.—*Conditions of temperature and rainfall affecting vegetation in Bermuda.**

	Temperature of the air.		Temperature of the soil.		Mean rainfall.
	9 a. m.	3 p. m.	6 inches.	12 inches.	
	°	°	°	°	In.
January.....	64.0	65.5	62.0	62.5	3.8
February.....	63.7	65.1	61.1	61.4	4.2
March.....	63.8	65.5	61.5	61.5	3.6
April.....	67.4	69.3	64.8	64.9	3.3
May.....	72.0	73.5	69.9	69.5	4.1
June.....	76.8	78.8	74.5	73.9	3.3
July.....	81.3	82.9	78.3	77.9	4.0
August.....	82.5	84.2	79.1	79.2	3.9
September.....	80.2	81.9	77.1	76.9	4.8
October.....	75.5	76.7	73.4	73.7	6.7
November.....	69.8	71.1	67.2	68.1	5.7
December.....	65.4	66.4	62.9	63.2	4.0
	71.9	73.4	69.3	69.4	51.4

*The mean temperatures are given by observations extending (with some *lacunæ*) from August, 1855, to March, 1877. The temperature of the soil at 6 inches is the mean between observations at 9 a. m. and 5 p. m., apparently the hours of extreme daily range. The temperature at 12 inches is that at 9 a. m.; the daily range at this depth is under 0°.5, and is about the mean at 9 a. m.

The earth temperatures are probably very near the true mean temperatures of the air. The rainfall is not the same all over the island. It is decidedly greater in the broader and more wooded region towards the center than at either extremity, and is least about the light-house, where the island is narrow and comparatively denuded of wood. There are grounds for supposing, also, that the mean temperature at the east end, probably under the influence of the cold northeast winds of winter, is lower than in the central regions; but these are niceties not affecting the present question.

Under the conditions of climate thus briefly described the cocoanut and sugar-cane grow, but not to perfection. The writer had no success with pine-apples, although they were formerly grown in Bermuda. The orange, lemon, lime, fig, mango, banana, pawpaw, avocado pear, pomegranate, loquat, litchi, and the anona family come to perfection. Strawberries and excellent celery, with all ordinary vegetables of the table, thrive in the winter. Apples, pears, plums, cherries, almonds, apricots, nectarines are a complete failure. The raspberry and blackberry die out, and neither rhubarb nor asparagus can be grown to any satisfaction. The peach, although not now actually produced, all the trees in the island being infested by the peach fly, was very abundant twenty years ago, and therefore differs from other stone fruits, in being suitable to the climate.

The reader of the following list will notice frequent references to "the

Walsingham tract." This remarkable region is a narrow ridge, about two miles long and from a quarter to half a mile wide, which separates Castle Harbor from Harrington Sound, at the east end of the islands, and does not altogether comprise above 200 acres, including Tucker's Town. It contains nearly the whole of the indigenous vegetation of the group. A few characteristic species, such as *Randia aculeata*, *Pavonia spinifex*, *Myginda Rhacoma*, are only found at the other end, and a few are diffused here and there pretty generally. Such are *Eugenia axillaris*, *Forestiera porulosa*, and *Dodonæa viscosa*. But, on the whole, this small tract is the Mecca of the botanist in Bermuda, and his pilgrimages will be many before he exhausts it. For this we must, of course, seek a geological cause. This narrow ridge of land, honey-combed by caverns, fretted with the dissolving rains of ages, and rent by fissures, is, in the writer's opinion, the last surviving contemporary of former Bermudas that have disappeared, whose surface-rocks form the reefs that fill Castle Harbor and both the sounds, and form the northern barriers against the fury of the Atlantic. The evidence in support of this opinion would be out of place in this section. It will be evident that if such be the case, we should expect to find here, as we do find it, the greatest accumulation of those species which, not being capable of self-origination anywhere, can only have reached this very isolated spot by the slow operation of natural causes long continued. The surface of the contemporary Bermuda is not of high geological antiquity, as follows necessarily from its Æolian origin and its continuous subsidence, but what it has of antiquity is to all appearance found here.

The following is a list of 25 species exclusively or almost exclusively to be looked for in the Walsingham tract. They are nearly all West Indian; few of them American in the sense of belonging to regions of corresponding latitude on the continent.

<i>Æschynomene</i> , sp	W. I.	<i>Jatropha Curcas</i>	W. I.
<i>Ampelopsis quinquefolia</i>	A.	<i>Passiflora ciliata</i>	W. I.
<i>Asplenium crenulatum</i>		<i>Peperomia obtusifolia</i>	W. I.
<i>Asplenium myriophyllum</i>		<i>Psilotum triquetrum</i>	W. I.
<i>Callicarpa ferruginea</i>	W. I.	<i>Psychotria undata</i>	W. I.
<i>Chiococca racemosa</i>	W. I.	<i>Pteris heterophylla</i>	W. I.
<i>Dodonæa viscosa</i>	W. I.	<i>Sabal Adansonii</i>	A.
<i>Elæodendron xylocarpum</i>	W. I.	<i>Sicyos angulatus</i>	A.
<i>Eugenia axillaris</i>	W. I.	<i>Sponia Lamareckiana</i>	W. I.
<i>Forestiera porulosa</i>	W. I.	<i>Statice Limonium</i> , var. <i>Caroliniana</i> ..	A.
<i>Guilandina Bonducella</i>	W. I.	<i>Triumfetta semitriloba</i>	W. I.
<i>Ipomœa purpurea</i>	W. I.	<i>Xanthoxylum Clava-Herculis</i>	W. I.
<i>Jasminum gracile</i>	W. I.		

The species in the general list which the writer considers to be native—that is to say, introduced by natural causes irrespective of human agency, and probably earlier than the settlement of the islands in 1612—are 150 in number, distinguished by the letter A in the alphabetical index. For the convenience of the botanical reader they are here enumerated.

List A.—Species regarded as native.

Acrostichum aureum.....	W. I., A.	Eleocharis plantaginea.....	W. I., A.
Adiantum cuneatum.....	S. A.	Equisetum palustre.....	A.
Æschynomene, sp.....	W. I., A.	Eugenia axillaris.....	W. I.
Ampelopsis quinquefolia.....	A.	Forestiera poralosa.....	W. I.
Arundinaria tecta.....	A.	Guilandina Bonducella.....	W. I.
Asclepias Curassavica.....	W. I.	Heliotropium Curassavicum....	W. I., A.
Aseyrum Crux Andreæ.....	A.	Herpestis Monniera.....	W. I., A.
Aspidium capense.....	S. A.	Hydrocotyle Asiatica.....	W. I.
Aspidium Thelypteris.....	A.	Hydrocotyle repanda.....	A.
Asplenium crenulatum.....	W. I.	Hydrocotyle umbellata.....	W. I.
Asplenium dentatum.....	W. I., A.	Ipomœa Jamaicensis.....	W. I.
Asplenium myriophyllum.....	W. I., A.	Ipomœa Nil.....	W. I.
Asplenium Trichomanes.....	A.	Ipomœa Pes-capræ.....	W. I., A.
Atriplex cristata.....	S. U. S.	Ipomœa purpurea.....	W. I.
Avicennia nitida.....	W. I.	Ipomœa sagittata.....	A.
Baccharis heterophylla*.....		Juncus maritimus.....	A.
Boehmeria cylindrica.....	W. I., A.	Juncus tenuis.....	W. I., A.
Borrchia arborescens.....	W. I., S. U. S.	Jungermannia sp.....	
Cakile maritima.....	W. I.	Juniperus Bermudiana.....	W. I.
Cakile maritima, var. ? æqualis.	W. I.	Kosteletzkya Virginica.....	A.
Callicarpa ferruginea.....	W. I.	Laguncularia racemosa.....	W. I., A.
Canavalia obtusifolia.....	W. I.	Lemna minor.....	W. I., A.
Cardiospermum Halicacabum ..	W. I., A.	Lemna trisulca.....	W. I., N. U. S.
Cardiospermum Halicacabum,		Lippia micromera.....	W. I.
var microcarpum.....	W. I.	Lippia nodiflora.....	W. I., A.
Celtis Missisipiensis.....	A.	Lippia lanceolata.....	W. I.
Cenchrus echinatus.....	W. I., A.	Lithospermum distichum.....	W. I.
Cenchrus tribuloides.....	W. I., A.	Montia fontana.....	E.
Centrosema Virginianum.....	W. I., A.	Morinda roioe.....	W. I., A.
Ceratophyllum demersum.....	W. I., A.	Myginda Rhacoma.....	W. I., A.
Chara fetida.....	W. I., A.	Myrica cerifera.....	A.
Chiococca racemosa.....	W. I., A.	Nama Jamaicensis.....	W. I., A.
Coccoloba uvifera.....	W. I., A.	Nepeta Cataria.....	A.
Conocarpus erectus.....	W. I., A.	Nephrodium amplum.....	W. I., S. A.
Convolvulus Jamaicensis.....	W. I.	Nephrodium patens.....	A.
Dichondra Carolinensis.....	A.	Nephrodium tetragonum.....	S. A.
Dichondra repens.....	W. I., A.	Nephrodium villosum.....	W. I., S. A.
Desmodium virgatum.....	W. I.	Nephrolepis exaltata.....	W. I., A.
Dodonæa viscosa.....	W. I., A.	Oenothera biennis.....	A.
Eclipta erecta.....	W. I., A.	Oenothera humifusa.....	A.
Elæodendron xylocarpum.....	W. I.	Oenothera rosea.....	W. I.
Elæodendron melanocarpum....	A.	Oenothera sinuata.....	A.

* There are five West Indian and three American species, but none of them the same as the Bermuda species.

<i>Opuntia Tuna</i>	W. I.	<i>Scœvola Plumieri</i>	W. I., A.
<i>Opuntia vulgaris</i>	A.	<i>Scirpus plantagineus</i>	W. I.
<i>Osmunda cinnamomea</i>	A.	<i>Scirpus validus</i>	W. I.
<i>Osmunda regalis</i>	A.	<i>Senebiera pinnatifida</i>	W. I., A.
<i>Panicum brevifolium</i>	W. I.	<i>Sesuvium Portulacastrum</i>	W. I., A.
<i>Panicum capillare</i>	A.	<i>Sicyos angulatus</i>	A.
<i>Panicum lineare</i>	A.	<i>Sida carpinifolia</i>	W. I.
<i>Panicum molle</i>	W. I.	<i>Sisyrinchium Bermudiana</i>	
<i>Panicum virgatum</i>	A.	<i>Solanum nigrum</i>	W. I., A.
<i>Paspalum distichum</i>	W. I., A.	<i>Solanum nigrum</i> , var. <i>nodiflorum</i>	W. I.
<i>Paspalum filiforme</i>	W. I.	<i>Solanum torvum</i>	W. I.
<i>Paspalum setaceum</i>	W. I.	<i>Sophora tomentosa</i>	W. I., A.
<i>Pavonia spinifex</i>	W. I.	<i>Spagnum palustre</i>	
<i>Phryma leptostachya</i>	A.	<i>Spermacece tenuior</i>	W. I., A.
<i>Pluchea odorata</i>	W. I.	<i>Spiranthes brevilabris</i>	W. I.
<i>Pluchea purpurascens</i>	W. I., A.	<i>Sponia Lamarekiana</i>	W. I.
<i>Polypodium plumula</i>	W. I.	<i>Sponia elongatus</i>	W. I.
<i>Polypogon Monspelienis</i>	A.	<i>Sporobolus Indicus</i>	W. I., A.
<i>Portulaca oleracea</i>	W. I., A.	<i>Sporobolus pungens</i>	S. A.
<i>Psilotum triquetrum</i>	W. I., A.	<i>Sporobolus Virginicus</i>	W. I., A.
<i>Pteris aquilina</i>	W. I., A.	<i>Stachytarpheta Jamaicensis</i>	W. I., A.
<i>Pteris heterophylla</i>	W. I.	<i>Statice Limonium</i> , var. <i>Caroli-</i>	
<i>Rhachicallis rupestris</i>	W. I.	<i>niana</i>	A.
<i>Rhizophora mangle</i>	W. I., A.	<i>Stenotaphrum Americanum</i>	W. I., A.
<i>Rhus Toxicodendron</i>	A.	<i>Suriana maritima</i>	W. I.
<i>Rhynchospora florida</i>	W. I.	<i>Tournefortia gnaphalodes</i>	W. I., A.
<i>Rhynchospora fusca</i>		<i>Triumfetta Lappula</i>	W. I.
<i>Rhynchospora pura syn</i>		<i>Triumfetta semitriloba</i>	W. I.
<i>Rhynchospora speciosa</i>		<i>Typha angustifolia</i>	W. I., A.
<i>Rhynchospora stellata</i>	W. I.	<i>Waltheria Americana</i>	W. I., A.
<i>Ricinus communis</i>	W. I., A.	<i>Woodwardia Virginica</i>	A.
<i>Ruppia maritima</i>	W. I., A.	<i>Xanthoxylum aromaticum</i>	W. I.
<i>Sabal Palmetto</i>	A.	<i>Yucca aloifolia</i>	W. I.
<i>Salicornia fruticosa</i>	A.	<i>Zostera marina</i>	

The distinction between this class and the next is arbitrary, and the classification has been governed by an estimate of probabilities in each case. Nature had a long reign in Bermuda. Man and the animals introduced by man have had a comparatively short period for modifying its flora. It seems safer to suppose that plants like *Guilandina Bonducella* or *Sicyos angulatus*, met with but once in a wild place and a wild state, are truly native, than to infer from their rarity that they have been introduced or have recently followed the footsteps of man.

The species then regarded as exotic, although completely naturalized, and for the most part generally diffused, that is to say, in the words of Sir Joseph Hooker, "species which have followed in the track of man or animals introduced by him, and have thus become quasi-indigenous, or naturalized,"* are 166 in number, distinguished by the letter B. The

* Sir Joseph Hooker. Lecture on Insular Floras, delivered before the British Association for the Advancement of Science, at Nottingham, 1866.

importation of seeds for *agricultural* and *horticultural* purposes for two centuries and a half accounts for a great number of chance species, especially the importation of hay from America.

The species which may also be said to be naturalized, but were originally introduced, designedly for cultivation or ornament, whose presence is, therefore, due to direct human agency, more or less traceable, and which cannot in any sense be regarded as native, 414 in number, are distinguished by the letter C.

Lastly, there remains a large and fluctuating class of plants, of horticultural but not botanical interest, which are found here and there under cultivation, but have no proper place in the local flora. They are inserted in the catalogue to complete the view of the vegetation of Bermuda, as related to climate, and as it presents itself to the visitor. These names, 215 in number, are printed in *Italics*. Many of them date no further back than the writer's term of residence at Government House, where one of his first acts was to import a professed gardener, Mr. Michael Middleton, and a skilled laborer, George Payne, from Kew. They arrived in November, 1871, and from that time to the end of 1876, few months passed without the introduction and trial of new plants. Under a friendly rivalry, many more were at the same time brought up from the West Indies to Clarence House, by successive naval commanders-in-chief, especially by Admiral Sir Cooper Key, who followed the governor's example in erecting a conservatory. The present governor, Sir Robert Laffan, has long been known for a taste for horticulture. The garden proper at Mount Langton is, unfortunately, of very limited extent, and of a light, poor soil, possessing only the advantage of abundant water. The grounds are extensive, but made up of hills and slopes, thinly clothed with soil, much exposed to northerly winds, and offering very few spots favorable for planting. It adds not a little to practical difficulties that cartage is rendered tedious and laborious by the distribution of the premises. All this notwithstanding, much was done in the years 1871-'76 to extend the flora of the island, and a considerable amount of horticultural experience gained, which should not be thrown away. The social circumstances of Bermuda are peculiar. The resident gentry are too few in number to keep up a corps of professional gardeners; the colored native laborers are rarely intelligent enough for the trade, do not appear to have much natural taste for flowers, although somewhat given to depredations in gardens, and have had very little opportunity of learning. It

would be difficult to find anywhere such neglect of ornamental planting as is observable round the cottages of Bermuda. A sort of aversion to manual labor, which survives among the whites wherever slavery has prevailed, and no doubt also something enervating in the climate, make amateur gardening less active and busy, especially among the ladies of the island, than the great advantages of the climate would lead one to expect. There are but few florists, and an inexhaustible source of pleasure has still to be better appreciated. The record of horticultural successes and failures at Mount Langton, and the presentation in one list of all the species, whether ornamental or useful, cultivated or capable of cultivation, must stimulate horticulture, and may possibly open a new industry. The director of the American Museum of Natural History, Central Park, New York, had it in contemplation, in 1876, to establish a tropical nursery in Bermuda, and there is no reason, in days when Covent Garden market is supplied with flowers from the south of France, why New York should not be supplied from the Insulas Æstivarum.

The writer lost no opportunity of ascertaining the names, if any, by which plants are currently known. They are comparatively few in number, and it is not easy to determine whether, for example, "Snuff plant" for *Buddleia neemda* is, like "Wire weed" for *Sida carpinifolia*, universal, or of limited circulation. For the particulars given of the dates of introduction of many now common species, the writer is chiefly indebted to the late Mr. W. B. Perot, of Par-la-ville, and to the Hon. John Harvey Darrell.

Francis André Michaux, who touched at Bermuda in 1806, is the only botanist of eminence who has as yet done so. The following account of his visit occurs in "Annales du Museum d'Histoire Naturelle," for 1807. Having set sail from Bordeaux on February 5, 1806, for Charleston, he intended to explore the Southern States of America. On March 23, the vessel was captured by H. M. S. Leander, and sent to Halifax, Michaux being the only passenger who was allowed the privilege of going on board the Leander, where he seems to have received every attention from Captain Wetheby, her commander. Arriving at the Bermudas on April 7, they remained there eight days, and Michaux was allowed to go ashore. He gives a fair account of the general appearance of the islands, but his flora is very meager, only comprising the following species: *Juniperus Bermudiana*; *Verbascum Thapsus*; *Anagallis arvensis*; *Leontodon Taraxacum*; *Plantago major*; *Urtica urens*; *Gentiana nana*; *Oxalis*

acetosella. The "sage brush" is mentioned, but not identified; also a species of *Verbena* and a *Medicago*. He appears to have regretted his inability to procure ripe berries of the cedar, owing to his visit being during the flowering season, as it was his desire to have introduced the tree into the island of Corsica and the southern departments of France which border on the Mediterranean.

The earliest general list of Plants was compiled by Mr. A. W. Lance, naval school-master on board H. M. S. *Illustrious*, in 1845. It contains 127 species, but is unpublished. The MS. presented by Governor Reid is in the Public Library, Hamilton. Grisebach occasionally refers to his herbarium. Dr. Rein, who resided in Bermuda, about 1853, in the capacity of tutor, printed, 1873, a list comprising LVI orders and 128 species, exclusive of Algæ.* In the same year, Mr. J. Matthew Jones published a paper on the vegetation of the Bermudas, in the *Proceedings and Transactions of the Nova Scotia Institute of Natural Science*.

Grisebach notes about 18 West Indian plants as natives of Bermudas in his flora of the British West Indian Islands, 1864, but had evidently very imperfect information before him.

Mr. H. R. Moseley, naturalist and botanical collector of H. M. S. *Challenger*, had the good fortune to visit the islands at a favorable time of year (in parts of April, May, and June, 1873), and collected plants with indefatigable diligence, but, of course, missed those which flower in autumn. Lastly, the writer, with a very slender knowledge of botany, made it an object and pursuit, during a residence of nearly six years, to make himself acquainted with the flora of the island, and found in Sir Joseph Hooker, Dr. Asa Gray, General Munro, Professor Sargent, Professor Oliver, and Professor Thiselton Dyer, friends ever ready to identify any specimen sent to them. From all these sources, aided by a too brief visit from Professor Ernst, of Caracas, in 1876, has the subjoined enumeration been compiled, and it is presented in tolerable confidence that there are not many native plants left unenumerated. There are, doubtless, plants in old gardens which have escaped notice; nothing but a house to house visitation can exhaust the possibilities of fresh discovery in this direction. The Bermudians of the last generation, and long before it, were eminently a sea-faring people, leaving at home their wives, and families, and slaves, and constantly returning with some rarity which had attracted their notice. Thus *Ipomœa tuberosa*,

* REIN, Ueber die Vegetations-Verhältnisse der Bermuda Inseln. <Senckenbergische naturforschende Gesellschaft. Frankfort, 1872-'73.

Brunfelsia Americana, *Phacelia congesta*, *Dolichos Lablab* were all added to the list, as the result of accidental observation in old gardens at St. George's.

Any scientific value the following list may possess, beyond its record of facts of observation, such as localities, times of flowering, &c., is due to the obliging supervision of Sir Joseph Hooker, under whose eye the classes have been rearranged, the references checked, and the nomenclature corrected. The writer is responsible for the distribution of the species as native, naturalized, or introduced, distinguished by the letters A, B, and C, in the index. The Linnæan orders and the etymology of names are given where they appear likely to be of assistance towards the identification of plants. Synonyms are only given where the names appear in Grisebach's flora, or in some accredited list of Bermuda plants.

J. H. LEFROY.

DECEMBER 31, 1879.

BOTANY OF THE BERMUDAS.

I.—RANUNCULACEÆ.

Clematis Flammula, Linn. Sweet Clematis.

Introduced originally from Southern Europe. It grows luxuriantly over a verandah in Reid Street, Hamilton, flowering in autumn.

Clematis Japonica, Thunb., var *Jackmanni*.

Introduced in 1874 and flowered annually about July, but not freely.

Ranunculus muricatus, Linn. Buttercup.

Naturalized from Europe, and general.

Ranunculus parviflorus, Linn.

Common about Hamilton.

Delphinium consolida. Larkspur.

Garden varieties are common.

II.—MAGNOLIACEÆ.

Magnolia grandiflora, Linn. Magnolia.

A tree of large size at Peniston's, introduced from the Southern United States. It flowers in June. *M. glauca* Linn. and *M. purpurea* Curt. were introduced at Mount Langton in 1875, and flowered feebly, but died out. The climate or soil appeared not to suit them.

Liriodendron Tulipifera, Linn. Tulip tree or White Poplar of the Southern United States.

A healthy tree at Par-la-ville; flowers in June.

III.—ANONACEÆ.

Anona muricata, Linn., (*A. tripetala*, Ait.). Sour sop.

Introduced from the West Indies; met with in many old gardens.

A. squamosa, Linn. Sweet sop; Sugar apple.

Met with at Camden's, near Hamilton, but not common in the island. Native of South America.

A. Cherimolia, Mill. Cherimoya.

A rare fruit in Bermuda, first raised from seed in 1853. Native of South America.

A. reticulata Linn. Custard apple, Sugar apple.

Met with in many old gardens. A native of South America.

None of the Anonas are in any abundance, not, however, for want of suitable soil or a suitable climate. They are easily grown. The neglect of the cultivation of fruit is traceable to social causes, and to the want of a sufficiently large market.

IV.—NYPHÆACEÆ.

Nymphæa cærulea, Savign. and *N. dentata*, Sch. and Thonn.

Roots were procured from England in 1874 and survived two or three years, but made no growth and never flowered. They were tried in ditches with feebly running water and in tanks.

V.—SARRACENIACEÆ.

Sarracenia purpurea, Linn. Pitcher plant.

Was introduced at Mount Langton and flowered, but died off. The climate apparently too hot, although it is found from Florida northward.

VI.—PAPAVERACEÆ.

Argemone Mexicana, Linn. Queen thistle; Prickly poppy.

Very common—a yellow dye is sometimes made from the flowers. From the wide diffusion of this plant it may be native; name from argema, a disease of the eye for which the juice is supposed to be medicinal.

Papaver somniferum, Linn. Opium poppy.

Met with as a weed—introduced.

VII.—FUMARIACEÆ.

Fumaria officinalis, Linn. Common Fumitory.

A weed, abundant in cultivated ground.

VIII.—CRUCIFERÆ.

Nasturtium officinale, R. Br. Water-cress.

Abundant in the water channels of Pembroke marsh; grows also well on the wet soil. Plants raised from seed procured from the great market grounds of Hertfordshire in 1874 had no marked advantage over the indigenous species.

Nasturtium Armoracia, Fries. Horse-radish.

Cultivated occasionally in gardens.

For the so-called *Nasturtium* of Gardens, see *Tropæolum*.

Sisymbrium officinale, Scop. Hedge mustard.

A common weed by road-sides—easily recognized by its tall racemes and small yellow flowers. Probably introduced from Great Britain.

Senebiera didyma, Pers. Wart cress; Swine grass.

A coarse weed with prostrate stem, and deeply pinnatifid leaves, common. Introduced from Southern States.

Brassica oleracea, Linn.

Several varieties, as *B. capitata*, hort. (cabbage) and *B. botrytis*, Mill. (cauliflower), are cultivated. The latter has been attempted upon a somewhat large scale for the New York market, but was unsuccessful commercially, for want of more frequent and rapid communication.

Brassica Sinapistrum, Boiss. Charlock.

A weed in cultivated grounds.

Brassica nigra, Koch. Garden mustard. Cultivated.

Lepidium Virginicum, Linn. Pepper grass; Pepperwort.

Common; called by Dr. Rein *L. ruderale*, Linn. Name from *lepis* a scale, in reference to the form of the fruit. Introduced from Virginia.

L. sativum, Linn. Garden cress, gardens.

Capsella Bursa-pastoris Moh. Shepherd's purse.

A weed in gardens. Probably introduced from Great Britain, but of very general diffusion.

Iberis violacea Ait. Candytuft.

Quite naturalized by road-sides, chiefly in St. Georges Island, to which its delicate and abundant flowers are a pleasing ornament.

Cakile maritima, Scop., var. *æqualis* Sea-rocket? L. Her., Scurvy grass.

Very common along the shores, and occasionally cooked for food.

Raphanus sativus, Linn. Radish, cultivated.

Malcolmia maritima, R. Br.

Probably introduced from Europe.

Ciambe cordata Willd.?

From Cambridge, Mass., 1874.

Matthiola incana, R. Br. Wild stock.

To be found, but not abundantly, among the rocks along the southern shore, in Warwick Parish. Probably escaped from gardens.

Cheiranthus cheiri, Linn. Wall Flower.

Met with in gardens.

IX.—CAPPARIDACEÆ.

Cleome speciosa, H. B., Candelabra plant.

Native of Mexico, common in West Indies. Introduced and almost a weed, seeding itself abundantly at Mount Langton. Two varieties, purple and white. It grows to a height of 3 feet or more.

C. pungens, Willd. The white variety.

Capparis torulosa, Sw. var. of *C. Jamaicensis*, Jacq., Black willow.

To be found at Par-la-ville, where it may be recognized by its glossy leaves, rusty beneath, branches and inflorescence covered with scales; a shrubby tree about 10 feet high; name from the Arabic *Kabar*. The caper plant, *C. spinosa*, Linn., so abundant at Malta, would probably also thrive in similar situations in Bermuda, but is not known.

Steriphoma elliptica, Spreng.

Received from Trinidad 1874, and flowered.

Bull. Nat. Mus. No. 25.—4

X.—MORINGÆÆ.

Moringa pterygosperma, Gærtn. Horseradish tree.

Easily known by its large and graceful *decomposite-pinnatisect* leaves, and small white flowers. Originally of the Old World, but introduced from Turks Islands; may be seen at Somerville and elsewhere. This tree produces the famous Ben oil, extensively used by watch-makers.

XI.—RESEDACEÆ.

Reseda odorata, Linn.? Mignonette.

Cultivated in gardens.

XII.—CISTACEÆ. Rock rose family.

Cistus laurifolius, Linn.

C. salvifolius, Linn.

C. Monspeliensis, Linn.

Were introduced from Cambridge, Mass., in 1874, and were living in 1877, but did not appear to flourish.

XIII.—VIOLACEÆ.

Viola odorata Linn. Sweet violet.

A large variety is established at Mount Langton, and flowers sparingly; but the violet can scarcely be said to be known in Bermuda.

V. tricolor Linn. Pansy; Heart's-ease.

Grown in gardens.

XIV.—BIXINEÆ.

Bixa Orellana Linn.

Grew readily at Mount Langton, but is not generally met with. Introduced from West Indies.

Flacourtia Ramontchi Herit., W. Governor's Plum.

To be found in a few gardens only. A native of Madagascar and the East Indies.

F. prunifolia H. B.

Introduced at Mount Langton from Botanical Garden, Trinidad, 1872, but it did not appear to thrive, and had not flowered in 1877.

XV.—PITTOSPOREÆ.

Pittosporum coriaceum Ait.

A tree of considerable size at Bishop's lodge; no other specimen known. Probably introduced from Madeira.

P. undulatum, Vent., Laurel.

Native of New South Wales, and probably, therefore, of recent introduction. Its cymes of fragrant, graceful white flowers may be seen at the Rectory, Pagets Parish, and elsewhere in March-April; readily propagated by cuttings.

XVI.—CARYOPHYLLACEÆ.

Arenaria serpyllifolia, Linn. Thyme leaved sandwort.

A small annual weed; common in waste places; probably from Europe.

Stellaria media, Sm. Stickwort. Chickweed.

Common chickweed in gardens.

S. nemorum, Linn.

This species will be found in tangled creeping masses along the crags southwest of the Church cave. From the star-shaped flower.

Cerastium viscosum, Linn. Mouse ear; chickweed.

A weed from Europe.

PORTULACACEÆ.

Portulaca oleracea, Linn. Small-leaved Purslane, Turtle grass.

A very common yellow flowering weed in gardens; sometimes used as a pot herb. Probably native, being generally diffused in the West Indies and Southern States.

Sesuvium Portulacastrum H. B. Sea Purslane.

Found along the sea shore in moist places, and in Hamilton Parish marsh; may be distinguished by the absence of petals, the numerous stamens of deep rose color, and the delicate pink lining to the sepals, which are externally a bright green; otherwise much like Purslane in habit. Flowers in September.

Montia fontana, Linn. Water Chickweed.

Common in ponds and ditches.

XVII.—HYPERICACEÆ.

Ascyrum Crux-Andreæ, Linn. St. Andrews' cross, St. John's wort (*A. hypericoides*, Linn Sw.)

This pretty plant is abundant in Pembroke marsh, and not uncommon on hillsides in moist places, easily known by its delicate foliage, cross-shaped yellow flowers, and perforated leaves.

XVIII.—GUTTIFERÆ.

Mammea Americana, Linn. Mammea.

The Mammee fruit is ripe in September, but the trees are confined to a few old gardens—*e. g.*, at Cavendish, Devonshire Parish; originally from the West Indies. (*Lucuma Mammosa* in Reid's list.)

Calophyllum Calaba Jacq., Galba.

From the West Indies; a slow growing, useless tree, somewhat ornamental for its glossy leaves, and therefore planted in fences; flowers in August–September.

XIX.—TERNSTROMIACEÆ.

Camellia Japonica, Linn.

The camellia is scarcely known in Bermuda. Plants imported from Halifax nurseries have, however, flowered. The heat appears too great.

XX.—MALVACEÆ.

Sida carpinifolia, Linn. Wire weed.

Probably native or from the Canaries; very early mentioned in Laws, 1669; still a very abundant and troublesome weed.

Pavonia spinifex, Cav., Burr bush.

Found only in Southampton Parish, and not very common. Easily known by its curiously spiked fruit, or seed vessel; shrub 4 or 5 feet high, probably naturalized from the West Indies at no remote period, after Don José Padon.

Kosteletzkya Virginica, Pres. Mallow.

The very pretty rose-colored flowers of this plant appear in October, but are confined to the upper end of Pembroke marshes.

Abutilon striatum, Dicks. Mallow.

Common in gardens; introduced from Baltimore about 1852.

A. pulchellum. Sweet or White Abutilon.

In gardens, not common.

Hibiscus tiliaceus, Linn. Mahoe.

Known to have been raised about fifty years ago from seed washed on shore; one large handsome tree at Somerville, in Smith's Parish; smaller ones elsewhere; quite naturalized.

H. Rosa-Sinensis, Linn.

Common in gardens.

H. grandiflorus, Michx.

Introduced from Trinidad 1874, already well diffused; its splendid crimson flowers, produced in great abundance; are frequently 6 inches across. The seed could never be found ripe.

H. mutabilis, Linn., Changeable rose.

Common; flowers in October.

H. Cooperi, hort.

Ornamental variety with rose-colored margins round the leaves; introduced 1874, and found to grow readily at Mount Langton.

H. Bancroftianus, Macf.

Variety with thick fleshy, glossy, crenate leaves, which flowers rarely. At the public buildings and elsewhere.

H. populneus, Linn.

In the Cove at Clarence Hill, and elsewhere.

H. esculentus, Linn. Okra.

Is cultivated in gardens, and by some persons relished as a vegetable, of whom the writer is not one. *Abelmoschus esculentus* W. A.

Gossypium herbaceum, Linn. Cotton plant.

Originally from the East Indies. Cotton of this species was both grown and spun in Bermuda, in the last century, as it still is in India and Southern Europe. Old plants are to be met with, nearly small trees. The down is not now put to any economic use, and is superseded, for economic purposes, in the United States, by *G. album*, Wight, and *G. nigrum*, Hamilt.

Thespesia populnea Correa.

In a garden at St. Georges, where it is known as Gamboge tree by some original misapplication of the name.

Althæa rosea, Cav. Hollyhock.

Met with in gardens occasionally, of poor varieties.

Bombax ceiba, Linn. *id.* Silk cotton tree.

There are several of these trees at Mount Langton, planted by Gov-

ernor Reid; flower has not been observed on any. Young trees are met with elsewhere. (*Eriodendron anfractuosum*, DC.) native of West Indies; introduced by Sir W. Reid, about 1845.

XXI.—STERCULIACEÆ.

Sterculia Carthaginensis, Cav.

To be found in the old garden at Spanish Point (Mr. Shaw Wood's), where are several other rare trees, native of Continental America. It may be recognized by its unusually large palmate leaves.

Waltheria Americana, Linn.

Native, found in Pembroke marsh and on the hillside. From A. F. Walther, a botanist of Leipsic.

Guazuma tomentosa, H. B. Bastard Cedar of West Indies.

There is a healthy tree in the officer's garden, St. Georges.

XXII.—TILIACEÆ.

Triumfetta althæoides, Lam.

T. semitriloba, Linn., Burr or Boor bush.

A very common plant in the Walsingham tract; native, becomes a largish bush.

T. Lappula, Linn.

After Triumfetti, a botanist.

XXIII.—LINACEÆ.

Linum usitatissimum, Linn. Wild flag.

Plants are to be found naturalized in Pembroke marsh. It is mentioned as early as 1632, but does not appear to have ever been much cultivated. Probably from a Celtic word Llin, signifying thread, running through many languages.

XXIV.—GERANIACEÆ.

Oxalis cornua, Thunb. Sorrel.

O. microphylla, Poir.

With small, yellow flowers.

O. corniculata, Linn., var. *stricta*, Sav. Yellow wood-sorrel.

With largish, yellow flowers.

O. violacea, Linn. Purple wood-sorrel.

Also American.

XXV.—MALPIGHIACEÆ.

Malpighia setosa Speng. French cherry?

Prof. Oliver remarks: "This may be what Grisebach calls *M. puniceifolia*, Linn. A large, bushy tree, by the officer's library, north of the Hospital Prospect, and at Mr. Zuills, Smith's parish. Introduced in the last century. It flowers in June.

XXVI.—ZYGOPHYLLÆ.

Guaiacum officinale, Linn. Lignum vitæ.

To be found in gardens. From Guaiac, the native name in Guiana.

Melianthus major, Linn. Honey Flower.

Luxuriant in the garden at Mount Langton. Originally from the Cape of Good Hope.

Pelargonium sp. Double geranium.

The climate and soil of Bermuda seem to suit the double varieties of *Pelargonium* remarkably well; these beautiful flowers are therefore very abundant, and of many shades, but chiefly scarlets. Of cultivated hybrids which are continually varying, the number and variety is considerable; but it is rare to see a geranium which would attract notice at the humblest flower show in England or America. This is more the consequence of want of skill in cultivation than the fault of the climate, but the plants straggle and run to wood in a vexatious way.

Pelargonium ———. Stork's bill; Sweet-scented geranium.

Is completely naturalized, but not to be found far from the neighborhood of houses and gardens. Its bright pink flowers and sweet-scented leaves are among the pleasures of the islands.

Geranium dissectum, Linn. Wild Crane's bill.

Quite naturalized on David's Island, originally British.

G. pusillum, Linn.

A smaller wild geranium. Also British.

Impatiens balsamina, Linn. Balsams; Snapweed.

An annual, cultivated in gardens, originally from the East Indies.

XXIX.—RUTACEÆ.

Quassia amara, Linn. Quassia.

Introduced at Mount Langton from the West Indies in 1874, and grew well, but had not flowered in 1877.

The name immortalizes Quassi, a negro slave of Surinam, who made known the medicinal properties of one of the species.

Ailanthus glandulosa, Desf.

Originally from China. Introduced by Governor Elliott. The finest trees are at the public buildings, Hamilton.

Xanthoxylum Clava-Herculis, Linn.

A single tree of about 10 inches diameter on a hill east of Paynter's vale. Easily known by the large pellucid points in the leaflets and their strongly aromatic taste. Although this tree was the object of numberless visits at all seasons, the writer could never find fruit or flower; nevertheless there are a few seedlings to be found among the *Sage* and *Sponia* bushes around.

According to one tradition this tree, now 30½ inches in girth, was planted about a century ago by a Mr. Paynter, and has not increased in size within memory; it does not however look an old tree. The writer inclines to believe that it is a last survivor of the native "yellow wood" frequently mentioned in the first accounts of the island.* Every endeavor to transplant young plants failed, owing to the impossibility of extricating their long tap root unbroken from the crevices of the rocks.

Citrus Limonum, Risso.

The common wild lemon, berry ovoid, tubercled or rugulose; very acid; leaf-stalks with scarcely any trace of a winged margin. (*C. spinosissima*, Rein.)

Var. called Pumpnosed lemon.

Var. with smooth skin of small size, 1¼ to 1½ inches in diameter and nearly globular. *C. limetta*, Risso.

Var. with smooth skin, of larger size, ovoid, called the Lisbon lemon.

*"The timber of the country consisteth of three sorts; the one is the cedar; very fine timber to worke upon, of color redde, and verie sweete; the other sorts wee have no name for, for there is none in the company hath seen the like in other countries before wee came: some did thinke it to be *lignum vitæ* but it is not soe, it is a verie fine wood, of colour yellow, and it bears a leaf like unto a walnut tree, and the rine or barke is is much like a walnut tree, and the barke if one taste of it will bite one's tougue as if it were Ginney Pepper. That wood also is very sweet."

This description applies closely to *Xanthoxylum*. Professor Oliver, writing from Kew in October, 1872, having only leaves before him, remarked: "The leaves, strongly translucently dotted, without flowers, must belong to a species of *Xanthoxylum*, and agree fairly with a flowerless Dominica specimen, which has been queried as *X. aromaticum* but the species must remain doubtful until we have flower and fruit, which we shall be particularly obliged for." The visitor, therefore, who shall be so fortunate as to find the tree in flower, will help to solve a problem of unusual botanical interest.

Citrus Bigaradia, Loist. Bitter orange.

Berry large, orange-colored, smooth, bitter, and acid; a beautiful fruit in appearance; the flower is also very large and highly perfumed; leaves large, dark, and glossy. A handsome tree.

Citrus vulgaris, Risso. Seville orange.

Citrus Aurantium, Linn. Sweet orange.

Occasionally weighs over 1 pound, and is of excellent flavor. The best were in 1876 grown at Spanish Point.

Citrus nobilis, Lour. Mandarin orange.

Mandarine oranges of large size, and the finest quality, were produced by one tree at Mount Langton, but the fruit is not much met with.

Citrus nobilis, Lour. *var. minor*. Tangerine oranges.

Also rare in the Islands.

Citrus decumanus, Linn. Shaddock.

Grown at Somerville and elsewhere.

Citrus racemosus, Ris et Poit. Grape fruit.

So called from being produced in bunches. The trees may be distinguished by the very large, heart-shaped wings on the leaf-stalks.

Citrus buxifolia, Poir. (*C. Paradisi*, Macf.) Forbidden fruit.

A variety of the Shaddock, and rarely met with.

Citrus Medica, Linn. Citron.

Rarely met with.

Glycosmis pentaphylla var. *citrifolia*, Lindl.

In some gardens.

Oranges, formerly very abundant in Bermuda, and of excellent quality, have of late years comparatively died out. The quantity grown is nothing like equal to the local demand, and such extravagant prices as 3 shillings or even 4 shillings a dozen are sometimes asked for fine ones. This unfortunate result is due to a disease to which the trees are subject, to general horticultural neglect, and to the preoccupation of the good soil by more remunerative crops. The trees suffer extremely from a white coccus, with knobs or prominences on the exterior shell, which

sometimes covers the entire surface of the shoots and large portions of the leaves. The writer often had them brushed off small trees; and the twigs and leaves well syringed, to their great advantage, but a few weeks brought them back, and no systematic attempt is made to keep down this plague, which is equally injurious to several other trees; for example, the *Eugenia*, the *Avocada Pear*—even the *Cycas* and the *Yucca*. The creature, in fact, seems capable of deriving nourishment from the leaves or tender bark of nearly every description of plant. The insect form is entirely obliterated in the old females, which become mere shells full of eggs. The writer once found a negro engaged in laying bare the roots of some orange trees on Trunk Island, and learned that his object was to apply in some way whale oil to them. In general, however, the trees are suffered to run wild, little care is taken to prune them, or to cut out dead wood, or to free branches which intersect, excoriate, and choke each other, and few young trees are planted. On all these accounts Bermuda can never rival Florida, where the orange is now grown on the largest scale of farming, with all the resources of horticultural skill; but the fruit might be much more abundant than it is for the benefit of the inhabitants.

The Bermuda Company sent out orange, lemon, and citron seeds in 1616.* In 1621 the governor was able to refresh a shipwrecked party with the fruit,† and from 1634 we find examples of rents paid in oranges and lemons.‡ Sir W. Reid, among his many beneficial measures, procured great quantities of young plants for distribution from Madeira about 1846, and bore strong testimony to the excellent quality of the fruit of the island growth.

Triphasia trifoliata, DC.

To be found as a low creeping bush in some gardens. Introduced.

Murraya exotica, Linn. Martinique Laurel.

A very ornamental shrub, not uncommon in gardens. Introduced from West Indies.

Cookia punctata, Retz. Wampee.

In a few gardens. Introduced by Governor Elliot.

XXXI.—MELIACEÆ.

Melia Azedarach, Linn. Pride of India; in the United States, Pride of China.

A short-lived tree, worthless as timber, but valuable for shade and

* I., p. 117.

† I., p. 158.

‡ I., p. 405.

for the beauty of its flowers. Introduced from Charleston, South Carolina, about 1782. The *Melia* loses its leaves for a few weeks in winter. Flower begins to appear in February. It has astonishing powers of vitality in transplantation, and is popularly supposed to afford a cooler shade than any other tree. Originally from Asia Minor.

Swietenia mahagoni, Linn. Mahogany.

There is one conspicuous and well-known tree at the Flatts; but a few young trees are met with. Introduced from the West Indies.

Chloroxylon Swietenia, Linn. Satinwood.

Some young trees introduced from the West Indies at Mount Langton.

XXXII.—ILICINEÆ.

Ilex Cassine, Walt. Holly; Box; South Sea Tea.

This plant is now pretty common, especially near the Flatts, and in Smith and Hamilton Parishes, where it was introduced from Virginia by a Mr. Peniston in the last century. The bright red berries are much sought after for Christmas decorations. (*I. vomitoria*, Ait.)

I. aquifolium Marsh. English Holly.

Was to be found in the garden of Mr. Ayland, St. George's, apparently flourishing. *Ilex* is a word of disputed etymology.

XXXIII.—CELASTRACEÆ.

Elæodendron xylocarpum, DC. Olive wood Bark (*E. orientale* in Lane's list.)

A very interesting native tree, repeatedly alluded to in old laws, where, however, it is confused with *Conocarpus*, *q. v.* The astringent properties of the bark marked it out for the purposes of the tanner, and it was necessary as early as 1650 to restrain persons from unlawfully cutting it. It is now found only in the Walsingham tract, and but little of it left there. Flowers in March and April. Name from *elaia*, an olive, *dendron*, a tree, Gr.; to which, however it has very little resemblance.

Myginda Rhacoma, Sw.

A native shrub, bearing a small eatable berry, found only in Southampton Parish, of West Indian origin, but found also in Florida. The fruit is ripe in January; probably, therefore, flowers in the autumn. Name from Mygind, a botanist.

Euonymus Japonica, Linn.

A shrub found in gardens pretty commonly.

XXXIV.—RHAMNEÆ.

Colubrina Asiatica, Brongn.

Found growing on St. David's Island by Dr. Greenwood, R. A.

Phyllica odorata, Cass.

Identified in 1873; no note of its place of growth.

XXXV.—AMPELIDEÆ.

Vitis vinifera, Linn. Grape-vine.

"Vynes and vyne cuttings" were furnished to the first settlers in Bermuda in 1616. Probably white grapes from Spain; at least such are the oldest vines extant, and from the general resemblance which the climate of Bermuda bears to that of Madeira, which is especially close from November to May, the founders of the colony doubtless anticipated a similar success in their cultivation; in this, as in so many other expectations, they were disappointed. Very fine grapes have been grown in Bermuda, but not in great abundance, and the climate is too near that of the West Indies, where the vine does *not* succeed, to be considered favorable to it. The soil is also generally too poor.

The vine loses its leaves in November, and begins to recover them in February. The interval of rest has not been observed with much accuracy, but does not appear to exceed 120 days. It is given by DeCandolle as 157 days at Medeira.*

The writer imported and distributed a great number of the best English hot-house varieties, especially Black Hamburgs and Muscats of various denominations, and they bore in Mount Langton Garden, when only 3 years old, fruit which as to flavor left nothing to be wished; the best bearing vine, however, was one transplanted out of an old garden where it grew in a marsh. It was layered in marshy ground, where the water habitually stood, in a ditch close alongside the trellis, at 6 to 12 inches only below the level of the soil, having a mean temperature of about 21° C. (70° Fahr.). Under these singular circumstances it produced very fine and highly-flavored fruit, akin to Black Hambro', but redder in color. The bunches, however, rarely reached 1 pound, but single berries were often an inch in diameter.

These vines were skillfully pruned, the bunches thinned, and the berries also thinned, by an English gardener. In general, vines in Bermuda are left entirely to nature. It is customary to let them run over a horizontal trellis for shade, but they are scarcely ever touched with

* Géographie Botanique, 1855, I., p. 47.

the knife, and never manured—a neglect which fully accounts for the poor quality of the fruit.

An interesting example of the diffusion of plants was afforded by the foundering of the ship *Minnie Breslauer*, on January 6, 1873, on the south shore. She had a cargo of white Lisbon grapes, many of which were washed on shore and germinated at high-water mark. Numbers of plants were, from curiosity, taken up and transplanted, some of which bore fruit in 1876.

The vine flowers in February; bears in July.

The following comparison of the approximate mean temperature of the vine-growing region of Madeira (below 2,000 feet) with that of Bermuda (below 200 feet) makes the essential difference of the two climates very apparent.

Month	Madeira.	Bermuda.	Month.	Madeira.	Bermuda.
January.....	61. 9†	63. 3‡	July.....	64. 4* to 70. 1†	80. 3‡
February.....	62. 7†	63. 0‡	August.....	65. 5* to 71. 0†	81. 7‡
March.....	64. 0†	63. 3‡	September.....	65. 8* to 70. 9†	79. 8‡
April.....	56. 3* to 67. 1†	66. 5‡	October.....	63. 0* to 68. 7†	73. 7‡
May.....	56. 7* to 68. 4†	70. 4‡	November.....	59. 5* to 65. 0†	68. 6‡
June.....	60. 2* to 68. 2†	76. 0‡	December.....	62. 6†	64. 3‡

* DeCandolle, *Géogr. botanique*, I, p. 387. These are the approximate temperatures at the upper limit of 676^m, or 2,000 feet.

† Temperatures toward the sea-level or at the lower limit, from Dr. M. C. Grabham, on the Climate and Resources of Madeira, 1870.

‡ By interpolation.

Ampelopsis quinquefolia, Michx. Virginian creeper; Sarsaparilla.

This plant is to be found wild about the caves of Walsingham.

Ampelopsis tridentata, Thun.

Introduced in 1875 and doing well at Mount Langton.

Cissus discolor, Blum.

This beautiful creeper flourishes with great luxuriance at Mount Langton, under glass, losing its leaves regularly in the winter. A specimen was also found in a garden at Saint George's, unprotected, but it barely lived through the winters.

XXXVI.—SAPINDACEÆ.

Cardiospermum Halicacabum, Linn. Small shot.

This pretty little creeper is common in the Walsingham tract, and rarely met with elsewhere; native. Common to Africa and America.

Cupania fulva, Mart.

A single tree is to be found at Spanish Point, where it flowers very freely in July; native of the West Indies. Introduced.

Blighia sapida, Kæn.

A tree of the West Indies; originally from West Africa. In the garden at Par-la-ville; flowers in July. Fruit ripe in November.

Sapindus Saponaria, Linn. Soapberry.

In a few gardens; flowers in November.

S. longifolius, Vahl.

At Mount Langton; a small tree which had not flowered down to 1876.

Dodonæa viscosa, Linn. Broom; Dogwood.

Pretty generally diffused; abundant at the east end of Harrington Sound; may be known by its highly colored, winged seed-vessels; flowers in March. Identified by Grisebach and Dr. Rein as *D. angustifolia*, Lam. Possibly both specimens are found; named after Dodæus, a botanist.

Nephelium Litchi, Lour. Lee-chee or Litchi.

Introduced by Governor Elliott about 1853.

A tree at Mount Langton bore abundantly in 1871; flowers about February. Fruit in August. (*Dimocarpus Litchi*, Lour.)

Koelreuteria paniculata.

A native of China. Introduced. The locality in which it was found has not been noted.

Pavia, sp.

A tree in the grounds of Mrs. Ewing, Hamilton, digitate leaves, which has never flowered; appears to be *Pavia humilis* of the Horse-chestnut family.

XXXVII.—TEREBINTHACEÆ.

Rhus Toxicodendron, Linn. Poison ivy.

Native, and among the plants mentioned by the earliest travelers (1623). Common in good soil, and viewed with much dread by the inhabitants. Different constitutions are susceptible in very different degrees to the poisonous emanations of this plant; many persons can handle it and smell the flowers, which are very fragrant, with impunity; others have painful blisters produced on the face and hands by going near it, and, as is sometimes asserted, without being conscious of its presence.

Rhus excisa, Thunb.

Introduced from Cambridge, Mass., 1875.

Rhus juglandifolia, Willd. Walnut-leaved Rhus.

A native of Nepal. Introduced at Mount Langton from the West Indies, 1875, and well established.

Schinus molle, Linn. Spanish pepper.

A native of Peru; raised from seed received from Gibraltar, and well established.

Mangifera Indica, Linn. Mango.

The mango is a fruit in Bermuda. A tree at Mount Langton bears abundantly. Introduced by Governor Elliot. Flowers February to April; fruit, August and September.

XXXVIII.—LEGUMINOSÆ.

Ulex Europæus, Linn. Gorse or furze.

Raised in quantity from seed, about 1874, at Mount Langton, where it established itself and flowered freely for a year or two, but did not make continuous healthy growth. The climate is probably too hot for it so near the sea level. Its first introduction is due to Mr. J. M. Jones.

Medicago lupulina, Linn. Black Medick clover.

A common weed in pastures everywhere. Cattle only eat it when they are forced by hunger. It is mentioned by Michaux in 1808.

M. maculata, Willd.

M. muricata, All. With.

A common running weed, which covers large circular patches of ground, recognized by its prickly, coiled seed-vessels.

M. denticulata, Willd.

Indigofera tinctoria, Linn. Indigo.

Introduced for commercial purposes early in the seventeenth century, and now naturalized. It is mentioned as indico in 1623. There is no evidence that it was ever cultivated to profit.

Spartium junceum. Spanish Broom.

Raised from seed at Mount Langton, and flowered, but never established itself.

Aschynomene, sp.

A species not determined; is to be found at Paynter's Vale. It resembles a small mimosa.

Desmodium virgatum, Desv. (*Hedysarum virgatum*, Hamilt.) An herbaceous plant; to be found along the South Shore road in Devonshire Parish.

D. gyrans, Linn.

Was grown at Mount Langton.

Arachis hypogæa, Linn. Peanut or Earthnut.

Cultivated in a few gardens. Introduced from America.

Cajanus Indicus, Spreng. Pigeon pea.

Not uncommon, and occasionally eaten by the colored natives. Introduced from the West Indies.

Cytisus Laburnum, Linn. Laburnum.

Plants were raised from seed in 1872, but did not thrive.

Melilotus officinalis, Willd. Melilot.

Very common in cultivated grounds; of little value. Cows will eat it, but the patches are left untouched if there is other food.

Melilotus alba, Lam.

M. parviflora, Desf.

Trifolium pratense, Linn. Red clover.

One of a great variety of fodder plants; tried extensively on low ground at Mount Langton, 1875-'76, where it answered better than any other, and might be cultivated to advantage in parts of Pembroke marsh.

T. repens, Linn. White clover.

Similarly tried; did not appear to answer so well as red clover.

Robinia Pseudacacia, Linn. Common acacia; locust.

Introduced from the United States; there are well grown trees at the public buildings, Hamilton. (*R. dubia*, Fonc.)

Hedysarum Onobrychis. Saintfoin.

Said to be occasionally grown; but the writer never met with it. From Malta.

Wistaria frutescens, Poir. Wistaria.

A native of the Southern United States. Introduced at Mount Langton, 1874, where it flowered in April, 1877, but the plants did not make healthy growth; the soil was, perhaps, too light and calcareous.

Hardenbergia digitata, Lindl.

Raised from West Australian seed and established at Mount Langton; it flowers in April and May.

Vicia sativa, Linn. Vitch or tare.

A weed in pastures.

Lathyrus odoratus, Linn. Sweet pea.

Cultivated in gardens.

Pisum sativum, Linn. Common pea.

Cultivated in gardens, but to no great extent. An American variety called the Bird-eye pea, sown in June and July, is grown generally for fodder.

Phaseolus vulgaris, Linn. Kidney bean; French bean.

One of the most valuable products of the vegetable garden, and much grown.

Phaseolus sp.

A species not identified.

Ceratonia tiliqua, Linn. Locust.

This tree is not uncommon, but, no attention having been paid to the subject, nearly all the individuals appear to be male trees, especially in and about Hamilton; the fruit is consequently uncommon. Female trees may be found in Hamilton parish; flowers in June. Probably introduced in the present century.

Clitoria Ternatea, Linn. Blue pea.

Introduced at Mount Langton from the West Indies, 1873, but a native of India; single and double flowering, and naturalized, seeding abundantly.

C. Brasiliana, Arrab. Purple flowering pea.

Introduced at the same time; both plants are naturalized.

Centrosema Virginianum, Benth. Spurred Butterfly pea.

In Dr. Rein's list.

Vigna luteola, Benth.

Introduced from the West Indies, at Mount Langton, and naturalized; seeding abundantly.

Dolichos Lablab, Linn.

A beautiful variety with purple veins is to be found in some gardens at Saint George's; perhaps *D. purpureus*.

Another at Mount Langton.

Canavalia obtusifolia, DC. Bay bean.

Native, and to be found mixed with *Ipomea pes capræ* along the south shore; flowers in December. It is mentioned as early as 1623.

Psoralea glandulosa, Linn.

Sent from Cambridge in 1874. Doing well in 1877.

Balsamocarpon brevifolium, Chois.

A packet of seeds of this valuable plant was received from Kew in April, 1875. They germinated, but the young plants were all in succession attacked by some insect and none of them survived.

Adenocarpus telonensis, DC.

Introduced from Cambridge, Mass., 1874, and living 1877.

Argyrolobium androsemifolium.

The same remark.

Anthyllis Barba-Jovis, Linn.

The same remark.

Tamarindus Indica, Linn. Tamarind.

To judge from the size of the oldest trees, the Tamarind must have been introduced a century ago. One of the finest trees in the Islands is a Tamarind at Point Shares, which is 9 feet 6 inches in girth. One at Brightwood is said to be 14 feet in girth. No use is made of the fruit. This is but one of many examples of the neglect of minor industries by the natives of Bermuda. Preserves are imported, notwithstanding the abundance of native fruits suitable for making them.

Seeds of the great leguminous climber of the West Indies, *Entada scandens*, Benth., are often washed ashore in Bermuda, but the plant is not known to have ever grown.

Cæsalpinia pulcherrima, Sw. Barbadoes' Pride.

Barbadoes flower-fence, at the rectory, Southampton Parish, and elsewhere; naturalized in the West Indies; originally from the East Indies. (*Poinciana pulcherrima*, Linn.) Flowers in August.

Poinciana regia, Boj. *Poinciana*.

There are many trees about Hamilton. Two or three that were raised from the seed of 1870, in Mount Langton, first flowered in 1878. The leaflets are smaller and much more numerous than in the preceding species. Originally from Madagascar.

Casalpinia elata, Sw.

Was raised from seed brought from Turk's Island, in 1872, by Mr. Wingood, and flowered the third year; flowered in June. Originally from India.

Casalpinia Gilliesii, Wall.

Introduced from Cambridge, Mass., in 1874. Had not flowered in 1877. Originally from South America.

Colutea arborescens, Linn. Bladder senna.

Raised from seed sent from Kew, 1872, and flowered in Hamilton.

Erythrina velutina, Willd. Locust.

Several old and very large trees exist; the largest, now fallen, is at Mr. R. Tyne's, Devonshire Parish; the largest sound tree at Mr. Somers Tucker's, Smith's Parish. It is 12 feet round 6 feet from the ground, the huge roots allowing no nearer measurement. This tree does not in the least agree with the early description of the "yellow wood." But the wood has a strong tinge of yellow, and is employed on that account for inlaying. There is reason to think that it was formerly known to the inhabitants, as it is still to the soldiers, as the "yellow wood;" for in a map of Ireland Island, in the British Museum, dated 1694, a "yellow tree" is inserted as a landmark near the present site of the captain superintendent's house (N. side of his cove). The original or true yellow wood, however, is never mentioned by Norwood or late writers, as it probably would have been if known to them; and I infer that the yellow tree of 1694 was a "locust." The flowers are orange red, and appear in April. (Add. MSS. 5,415, G. 14.)

Erythrina, sp.

A large specimen at Mount Langton, passing as *Erythrina indica*, Lam. The seeds are, however, scarlet, whereas those of *E. indica* are black. It differs but little from the last, but the flowers are dark scarlet, the leaflets further asunder and more acute, petioles longer. It flowers from February to April, the first flowers preceding the leaves, which are very umbrageous.

Erythrina speciosa, Andr. Sword plant.

The *Bois immortelle* of the French West Indies, called by Dr. Rein *Catalpa corallodendron*, L. Seeds scarlet. The most common species in Bermuda. The wood is yellow, and it might be supposed to have been the "yellow wood" of 1694 but for the fact that it was first introduced by a gentleman still living, Mr. R. R. Darrell, about fifty years ago.

Erythrina cristægalli, Linn.

Only one specimen known, which is in a garden, formerly Mr. Kennedy's, Hamilton.

Erythrina caffra, Thunb.

Caffra-brom was raised from Cape seed, but had not flowered in 1877.

E. Corallodendron and *E. herbacea* were imported, but had not flowered in 1876.

Sophora tomentosa, Linn.

Native, and to be found sparingly along the southern shore and on Smith's Island; common in the tropics. The name is from the Arabic.

S. Chinensis, Todd.

Some plants received from the botanical gardens, Cambridge, Mass., did not thrive.

Myrospermum perniferum, D. C.

Introduced by Governor Reid, about 1846. A fine flowering tree at Mount Langton; others elsewhere.

Guilandina Bonducella, Linn. Nicker tree.

Native, but found only once in the Walsingham tract, in April, 1874, when it was in flower.

Pithecolobium Saman, Benth.

Plants received from Barbadoes grew at Mount Langton. (*Calliandra Saman*, Gr.)

Cassia Fistula, Linn.

A fine tree on War Department property, above naval wells; introduced from the West Indies.

C. bacillaris, Linn.

At Mount Langton; easily recognized by having only 4 leaflets.

C. bicapsularis, Linn. Christmas bush.

A climbing variety common in fences.

C. glauca, Lam. West Indian Ash.

At Somerville and Par-la-ville.

C. ligustrina, Linn.

Common in gardens; distinguishable by the very pointed leading leaflets, like Privet, whence the name.

C. occidentalis, Linn.

An annual weed in some gardens, especially at St. Georges.

C. corymbosa, Lam.

Introduced at Mount Langton from the United States, and flowered, but, being in a poor soil, is not likely to survive long.

The only species of *Cassia* quite naturalized is of a climbing habit, locally called the Christmas bush, having but 6 fertile stamens; here queried as *C. bicapsularis*, Linn.

Brownea grandiceps, Jacq.

Introduced from the West Indies at Mount Langton, 1875, and left thriving in 1877, but had not flowered.

Casparea porrecta, Kth. Napoleon's plume; often called *Bauhinia*.

To be found in gardens; a quick, growing, very ornamental shrub; flowers in May or June.

Bauhinia parviflora, Vahl.

A tree at the Model Farm, Smith's Parish; flowers in June.

Bauhinia Vahlii, Wight.

A beautiful white flowering variety, introduced from the Botanical Gardens, Trinidad, 1874; flowers freely at Mount Langton in June, and ripened seed.

Desmanthus virgatus, Willd. (*Desmodium virgatum*, Desv.)

Native; a shrubby plant to be found along the South road sides, in Devonshire Parish.

Mimosa pudica, Linn. Sensitive plant.

Raised from seed, and naturalized at Mount Langton.

Leucena glauca, Benth. Wild mimosa.

This pest is by no means so generally distributed in Bermuda as its extraordinary prolific qualities would have secured if its introduction had been at any remote date. It is given without remark by Dr. Rein, and is probably of recent introduction; but as the inhabitants cannot

be aroused to any adequate sense of the duty of extirpating it, there cannot be a doubt of the serious nuisance it must soon become. It is a plant which is capable of deriving nourishment from the poorest soil, and sends its long-tap root to a distance of many feet. It flowers and ripens seed nearly all the year around. Every seed seems to germinate. The writer has pulled out 300 seedlings from a space of one square yard. The ground at length becomes so full of them as to destroy all other vegetation.

Acacia macracantha, Humb. Bonpl.

Self-sprung from some West Indian soil at Mount Langton in 1874. It was suitably transplanted, and became a flourishing young tree, easily recognized by its fine foliage and very minute leaflets.

A. Arabica, Willd. Gum Arabic; Yellow mimosa

A yellow flowering acacia, not uncommon in gardens.

A. cygnorum, Meissn.

Was raised from seed received from West Australia, and flowered for a year or two at Mount Langton, but proved unable to stand the high winds.

A. Lebbek, Willd. Black ebony

Very fine trees are to be seen at Peniston's, Smith's Parish, the largest 66 inches round, but it is not uncommon elsewhere. Flowers in July. It loses its leaves in winter. Originally from the east; probably introduced from the West Indies in the last century. (*Albizia Lebbek*, Benth.)

Inga vera, Willd.

Tried at Mount Langton, from the West Indies. The plant languished for three or four years, but never made healthy growth.

XXXIX.—ROSACEÆ.

Chrysobalanus pellocarpus, Mey. Pork-fat apple.

In Mrs. Reed's and Mr. H. Trimingham's gardens. Flowers in July. Bears a purple fruit the size of a plum, the taste of which is very well described by its local or West Indian name.

Photinia arbutifolia, Lindl.

This Californian shrub was sent from Cambridge, Mass., in 1874, and was doing pretty well in 1877.

Prunus domestica, Linn. Plum.

Trees from Baltimore (Washington and Wilson's purple) were planted at Mount Langton in 1872, but did not bear fruit.

P. Armeniaca, Linn. Apricot.

The same result followed with apricots, and both are apparently unsuited to the climate of Bermuda, but specimens of the latter have been produced by Hon. E. Harvey, in Paget Parish.

P. occidentalis, Sw. West Indian plum.

P. sphærocarpa, Sw.

Specimens from Trinidad planted at Mount Langton in 1872 came to nothing.

Amygdalus Persica, Linn. Peach.

Formerly a very abundant fruit, but of late introduction; the trees are still numerous, but have been for about 20 years so infested by the American fly that the fruit may be considered extinct; a specimen not spoiled by the disease is nearly unknown.

The first peach trees that bore in Bermuda are said to have been raised in St. David's Island by a retired officer, Lieutenant Lang, from Madeira seeds. There had been American trees raised previously, but they bore no fruit—a result which followed the importation of a number of trees from Baltimore by the writer.

A. nectarina. Nectarine.

The same remark as to the apricot above.

A. communis, Linn. Sweet almond.

The same remark again.

A. amara, Hort. Bitter almond.

The same.

These trees were, however, unfortunately planted in bad soil at Mount Langton.

Fragaria Virginiana, Duchesne. Strawberry.

Wild strawberries have been found in Paget Parish, probably escaped from gardens. The fruit is but little grown, and generally from plants procured from Newfoundland, which begin to bear about New Year's day; at Mount Langton once as early as the end of November (1872), and as late as June (1874). The plants require renewal every second year. A much larger variety has been successfully raised at Clarence

Hill, from New York plants. There is nothing to prevent the fruit being abundant.

Rubus idæus, Linn. Raspberry.

It is clearly established that Bermuda is beyond the southern limit of this native American plant. It was perseveringly tried by Governor Lefroy and Hon. Eugenius Harvey, 1872-'76, and fruit actually produced by the latter, but the plants could not be kept alive.

Spiræa prunifolia, Sieb.

S. salicifolia, Linn.

Both species are to be found in gardens.

Geum radiatum?, Michx.

A common yellow-flowering weed in fields.

Rosa Carolina, Linn.

Tried with the like result.

R. laevigata?, Michx. Wild rose.

Naturalized in Pembroke marsh and in the Walsingham tract.

R. lutea, Brot., var. *Puniceæ*. Austrian briar.

Introduced from Cambridge, Mass, 1874, and very healthy 1877.

R. rubiginosa, Linn. Sweet briar.

Is found in gardens.

R. spinosissima, Linn.

R. Damascina, Linn.

The varieties cultivated in gardens are numerous, and embrace most of the common favorites; the flower is abundant, but from want of horticultural skill is rarely seen in high perfection. Many of the best species were from England and America introduced at Mount Langton, 1872-'76. The moss rose (*R. centifolia*, Linn.) does not succeed in Bermuda. White roses are in great profusion; as many as 2,000 blooms have been used in the Easter decoration of Trinity Church alone.

Cratægus pyracantha, Pers. Hawthorn.

At Camden and Mount Langton; but of a great number of species tried to be raised from seed in 1872, none succeeded in establishing themselves.

Pyrus Malus, Linn. Apple.

A few apples are grown in Bermuda, of an indifferent quality, and rather

as a curiosity than for use. A tree in Mr. Jackson's garden, Hamilton, is the most regular bearer; flowers February and March. A number of trees were planted at Mount Langton in 1872 and flowered, but never produced fruit.

Pyrus communis. Pear.

Pears have been produced, especially by Hon. Eugenius Harvey, 1876, but the tree does not succeed. Of 18 trees from Baltimore, planted at Mount Langton, 1872-76, not one bore fruit or made healthy growth. They were of 7 varieties.

Cydonia vulgaris, Pers. Quince.

Tolerably common, in moist ground, and bears pretty well. The tree degenerates to a straggling bush, and flowers irregularly in April and May.

Eriobotrya Japonica, Lindl. Photinia. Japan medlar.

Introduced from Malta by Sir W. Reid, about 1850, and now very common. It flowers about September; the fruit is ripe in January, and in good soil and sheltered situations is excellent.

XL.—SAXIFRAGEÆ.

Hydrangea hortensis, Sm.

The *Hydrangea* is almost unknown in Bermuda, although so common in Madeira. Imported plants rarely flower well, and soon die off, probably for want of moisture at the roots.

XLI.—PHILADELPHÆÆ.

Deutzia scabra, Thunb.

Grown in gardens.

XLII.—CRASSULACEÆ.

Bryophyllum calycinum, Salisb. Lip plant.

One of the commonest weeds. First introduced into Bermuda as a curiosity by a Captain Stowe, in 1813, but now naturalized everywhere. From *bryo*, I grow; *phyllon*, a leaf; Gr.

Echeveria gibbiflora, DC., var. *metallica*.

Introduced at Mount Langton, 1872, from Kew, and becoming common.

Kalanchoe, sp.

The same note.

Sedum acre, Linn. Stone crop.

Introduced at Mount Langton; this class of garden plants is, however, scarcely known in Bermuda.

XLIII.—RHIZOPHOREÆ.

Rhizophora Mangle, Linn. Mangrove.

Abundant in salt marshes everywhere; flowers in February. From *rhizon*, a root; *fero*, I bear; Gr.

XLIV.—COMBRETACEÆ.

Terminalia Catappa, Linn. Demerara almond.

Some fine trees at Mount Langton; flowers in June; named from the terminal leaves.

Laguncularia racemosa, Gært.

Native along the shore (*Conocarpus racemosus*, Linn.). Common to Southern United States and West Indies.

Conocarpus erectus, Linn. Sea mulberry; often called bark; button-tree; or alder.

Native, and universal along the shores in suitable places. Common to the Southern United States and to the West Indies; flowers in July. From *konos*, a cone; *karpos*, a fruit; Gr.

XLV.—MYRTACEÆ.

Jambosa vulgaris, DC. (*Eugenia Jambos*, Linn.) Rose apple.

To be found in a few gardens only. Flowers about March. Fruit ripe in June.

Eugenia axillaris, Poir., *ib. loc.* Stopper.

Native. Common in the Walsingham tract, and occasionally met with elsewhere, *e. g.*, at Point Shares. It flowers in September. This plant is peculiarly infested by the white coccus, and rarely has a healthy appearance. It is hard to find flower or berries.

E. uniflora, Linn., *ib. loc.* (*E. Michellii*, Lam.) Surinam cherry.

Naturalized, and common in gardens; both flower and fruit may be found in nearly every month of the year, but flowers chiefly February to May. In good soil the trees bear a very agreeable fruit, but it varies much in quality. Trees newly introduced from Trinidad, of a thorny variety, were much superior to those of local origin.

E. Malaccensis, Linn., *id.* (*Iambosa Malaccensis*, DC.)

At Par-la-ville, bore for the first time in 1878.

Pimenta vulgaris, W. A., *id.* Pimento; allspice.

At Long House, Hamilton.

P. acris, W. A., *id.* Pimento; allspice.

At Mount Langton, and elsewhere.

The species are easily distinguished, the former having 4, the latter 5 lobes to the calyx; flowers in June.

Psidium Guaiava, Rad. (*P. pomiferum*, *P. pyriforme*, Linn.) Guava.

Probably native, as it springs spontaneously, and is to be met with quite wild. It bears capriciously. The fruit is rarely abundant; flowers May, June, on to September. Fruit about December.

P. Cattleianum, Sabin., *loc.* Guava-berry; Governor plum.

In a garden near Paget church.

P. cordatum, Sims., *loc.* Myrtle guava.

At Somerville, in Smith's Parish.

Punica Granatum, Linn. Pomegranate.

Was grown in Bermuda as early as 1621, and probably found there, the introduction of early navigators. It is quite naturalized and often used in fences. Double flowering trees of great beauty are common.

Eucalyptus globulus, Sabil., *id.* Blue gum.

A number of trees were raised from seed in 1873, and one specimen in Pembroke Marsh attained a height of 12 feet, but required support against the winds, which precluded all hope of their being established.

E. resinifera, Smith. Red gum.

A specimen of this species resisted the wind, and appears capable of thriving.

E. coriacea, A. Cum.

A specimen of this species made very poor growth, but continued to live.

XLVI.—LYTHRARIÆ.

Lagerstræmia Indica, Linn. "Queen of the Shrubs." Crape myrtle of the U. S.

This very beautiful shrub was introduced from Caraccas by Capt. J. C. Austen, R. N., and is not uncommon. The largest tree is at Mount

Langton; flowers from May to September. Originally a native of China. There is said to be a white *Lagerstrœmia* on the island, but the writer never saw it.

XLVII.—ONAGRARIÆ.

Oenothera rosea, Ait.

Common on roadsides in Warwick Parish, and near Pembroke church.

O. longiflora, Jacq., *id.*

To be found along the south shores. Both these are West Indian.

O. humifusa, Nutt.

Found near Tucker's Town; a North American specimen.

O. sinuata, Linn.

Found on the shores near Shelly Bay; also North American.

O. biennis, Linn.

Isnardia repens, DC.

In marshes.

Gaura coccinea, Nutt., Ph.

Fuchsia coccinea, Linn. *id.* Fuchsia.

This plant is but little cultivated in Bermuda, and by no means as common as might be expected. The finer modern varieties are unknown.

XLVIII.—PASSIFLOREÆ.

Carica Papaya, Linn. Papaw.

Common, but not cultivated to any great extent, although it grows quickly and in poor soil. The leaves are popularly believed to have extraordinary curative effects, applied externally in rheumatic cases, and also to make meat tender. There are at least two varieties, originally from South America.

Passiflora laurifolia, Linn. Water lemon.

P. maliformis, Linn. Water lemon.

P. quadrangularis, Linn. Grenadilla. Water lemon.

These are met with in gardens, but the fruit is not abundant.

P. ciliata? Ait. Wild Passion flower.

The wild Passion flower, with 3-lobed, subserrate leaves, like *P. edulis*; glands at the top of the stalk; common about Walsingham and Paynter's Vale; flowers in August. The fruits are locally called apricots.

P. cœrulea? Linn.

Wild Passion flower, with 5-lobed leaves, not serrated; the glands more distant from the leaf; appears to flower more rarely. There is said to be another very small wild species, undetermined.

P. edulis? Linn.

A white-flowering species at Mount Langton, introduced from Madeira; bears an oval and quite uneatable berry of very strong taste, nearly as large as an egg.

P. princeps, Todd.

This lovely crimson species flowered with great luxuriance under glass at Mount Langton; introduced from England 1874.

Tacsonia mollissima, H. B., and *T. Van Voxemii*, Funk, were tried unsuccessfully at Mount Langton.

XLIX.—CUCURBITACEÆ.

Sicyos angulatus, Linn. Wild Bryone.

An American species of chance introduction; found about the Church Cave, Paynter's Vale.

Cucumis sativus, Linn. Cucumber.

C. Melo, Linn. Melon.

Cucurbita moschata, Linn., Musk melon, *Citrullus vulgaris* or *Cucurbita Citrullus*, Linn., Water melon, are cultivated in many varieties and plentiful in the early autumn months; also *Cucurbita Pepo*, Linn., Pumpkin; *C. Melopepo*, Linn., Squash; *C. maxima*, Gourd.

L.—BEGONIACEÆ.

Begonia fuchsioides, Hook.

Common in gardens.

B. hydrocotylifolia, Grah.

B. Rex, Pritz.

B. ulmifolia, Willd.

Are all to be found in gardens pretty commonly.

LI.—CACTEÆ.

Melocactus communis, DC. Turk's cap.

Common in gardens; probably brought from the Turk's Islands in the seventeenth century, when they were much frequented by Bermuda salt-rakers. From *melo*, melon and cactus.

Cereus triangularis, Haw. Night-flowering cereus.

C. grandiflorus, Haw.

Both common in gardens. From *cereus*, a torch.

Opuntia Tuna, Mill. Prickly pear.

Native, being mentioned as early as 1610. To be found everywhere. From *Opus*, a city in Greece, where it abounded.

O. tomentosa, Salm. Tall prickly pear.

One aged specimen at Mount Langton is about 15 feet high, and 30 inches round the stem.

O. vulgaris, Haw.

O. Pes-Corvi, Le Conte.

O. Ficus Indica, Mill.

O. coccinellifera, Mill.

Introduced with a view to the cultivation of the cochineal insect, for which, however, the climate is too wet.

The following species were introduced at Mount Langton from the Botanical Gardens, Cambridge, Mass., in 1875, and promised to establish themselves: *Opuntia dejecta*, Salm.; *O. flavicans*, Lemair; *O. integrifolia*, *O. longifolia*, *O. megacantha*, Salm.; *O. tomentosa*, Salm.

Pereskia aculeata, Mill. *id.* Barbadoes gooseberry.

Tolerably common in gardens, but not so much so as the agreeable acid of the fruit deserves. It bears very abundantly.

P. Bleo, DC.

A red-flowering variety, in some gardens; originally from Mexico.

LII.—FICOIDEÆ.

Mesembrianthemum, Linn.

Of a large number of species for which the writer was indebted to Professor Sargent, of Cambridge, Mass., in 1874, the following were living and thriving in 1877:

M. acinaciformum, DC.

can dens, Haw.

depressum, Haw.

edule, Linn.

M. heteropetalum, Haw.

multiflorum, Haw.

uncatum, Salm.

vaginatum, Lam.

The following were living, but appeared too tender for the climate

<i>M. canlescens</i> , Mill.	<i>M. rhomboideum</i> , Salm.
<i>emarginatum</i> , Linn.	<i>subincanum</i> , Haw.
<i>muricatum</i> , Haw.	<i>tennifolium</i> , Linn.
<i>violaceum</i> , D. C.	<i>uncinatum</i> , Linn.

There is thus good reason to suppose that this ornamental class of succulent plants at present hardly known in Bermuda might be easily naturalized.

LIII.—UMBELLIFERÆ.

Hydrocotyle umbellata, Linn. Pennywort.

In Devonshire marsh; American and West Indian species.

H. asiatica, Linn. Thick-leaved pennywort.

H. repanda, Pers.

The name is from *hudor*, water; *cotilé*, a vessel, Gr., from the cup-shape of the leaf.

Smyrniolum olusatrum, Linn. Alexanders.

Naturalized at St. George's. From *smyrna*, myrrh, Gr.

Pastinaca sativa, Linn. Parsnip.

Cultivated since the seventeenth century.

Daucus Carota, Linn. Carrot.

Cultivated.

Angelica Archangelica, Cham. and Schl. Angelica.

Cultivated.

Coriandrum sativum Linn. Coriandum.

Probably introduced by Portuguese immigrants from Madeira. It is quite naturalized in some fields at Point Shares, and became a weed, which may be known by its offensive smell. From *thoris*, a bug, Gr.

Anthriscus vulgaris. Rough chervil; iron weed.

A common weed. The name is used by Pliny.

Chærophyllum sativum, Lam. Garden chervil.

Found in gardens.

Anethum graveolens, Linn. May-weed.

Naturalized and common, especially on St. George's Island.

Torilis nodosa, Gærtn. Cancalis.

A weed, introduced from Europe.

Pimpinella laterifolia, Link. Burnet saxifrage.

A weed.

Ferula communis, Linn. (*Feniculum vulgare*, Gærtn.) Fennel.

In gardens; "sweet fennel"; probably the *Feniculum dulce* of botanists; is mentioned among seeds sent out in 1616.

F. glauca.

An ornamental species. Introduced from Cambridge Botanical Gardens, 1874.

Apium leptophyllum, F. M. Fool's parsley.

Naturalized, and found commonly in waste places.

Apium graveolens, Linn. Celery.

Cultivated at Mount Langton, and of excellent quality. The temperature of the soil at 12 inches' depth ranged from 58° to 70° during the season of its growth.

Petroselinum sativum, Hoffm. Parsley.

Cultivated, and occasionally exported to New York. (*Apium Petroselinum*, Linn.)

LIV.—ARALIACEÆ.

Hedera helix, Linn. Common ivy.

Hardly naturalized, and grown with some difficulty, but not uncommon, and prized for decorative purposes.

Aralia guilfoylia, Hort.

Received from Cambridge, Mass., 1874, and living 1877.

LV.—CORNACEÆ.

Cornus stricta? Lam. Stiff cornel or Dogwood.

A plant received from the United States appeared to thrive in a shrubbery at Mount Langton.

LVI.—CAPRIFOLIACEÆ.

Caprifolium Italicum, R. S. Honeysuckle, cultivated.

C. sempervirens, Michx. Trumpet honeysuckle.

In gardens, but not luxuriant.

Lonicera xylosteum, Linn. Fly honeysuckle.

Given by J. M. Jones.

Viburnum Tinus, Linn. Laurestinus.

There is an abundance of this plant at Mount Langton, where it was probably introduced at no distant date, and it grows in very poor soil, but it is scarcely met with elsewhere. There is no tradition as to its introduction. It is in flower in nearly every month.

Sambucus nigra, Linn. Common elder.

A few plants are met with on the islands; for example, on a cross road in Hamilton Parish.

Benthamia fragifera, Lindl.

At Mount Langton, where it did not appear to flourish, and did not flower. Originally from the East Indies.

LVII.—RUBIACEÆ.

Gardenia florida, Linn. Cape jasmine.

In a few gardens.

G. Fortunii.

Introduced at Mount Langton, 1875, and likely to establish itself.

G. nitida, Hook.

The same remark.

Randia aculeata, Linn. Box briar.

An interesting example of local naturalization. This plant, from the West Indies, overspreads the hills in the parish of Warwick and part of Paget, and is unknown in the eastern parishes. Flowers in September. (*R. latifolia* in Lane's list.)

Hoffmannia splendens, Benth., or *Higginsia splendens*, Hort.

Originally from Mexico? Introduced at Mount Langton, from Barbadoes, 1875, and readily established itself where screened from high wind.

Rondeletia odorata, Jacq.

Introduced from the Botanical Gardens, Trinidad, 1872, and established at Mount Langton. Flowers in July.

Chiococca racemosa, Jacq. Snowberry; Blolly.

Native, and common in the Walsingham tracts. Extremely fragrant and ornamental both in flower and fruit; deserves cultivation. It is a native of the West Indies, and flowers October to December.

Ixora coccinea, Linn.

Is frequently met with in gardens.

I. Javanica, DC. *I. amboyine*, DC. *I. acuminata*, Roxb.

All originally from the East Indies. Were introduced at Mount Langton in 1874.

Coffea Arabica, Linn. Coffee.

Quite naturalized, but confined to shady, moist recesses among the caves at Walsingham. It is not mentioned by any early writers. The berries give a coffee of good quality, but, except for curiosity, no use is made of them, and the quantity is very inconsiderable. Flowers in May and June.

Psychotria undata, Jacq.

Native; a shrub found in the Walsingham tract, where its bright, glossy, dark, wavy, green leaves, tapering at the base, attract attention; flowers (inconspicuous) in April and May.

Morinda Royoc, Linn.

Native; a West Indian plant, found in the Walsingham tract.

Spermacoce tenuior, Linn. Button-weed.

Native; a West Indian plant, found in the Walsingham tract; found also in Florida. From *sperma*, a seed; *aké*, a point, Gr. The seeds have two points.

Borreria laevis, Gr

Native; found also in Florida.

Galium rubrum, Endl.

Larger and less common species than the next; flowered June 15, 1873.

G. uniflorum, Michx. Bedstraw; "Heal-soon."

A very common weed; flowers in June and July.

Vaillantia hispida, Linn.

V. muralis, Linn. — (*Rhachicallis rupestris*, DC.)

Native, along the sea-shores.

LVIII.—VALERIANEÆ.

Centranthus macrosiphon, Bots.

A weed from Europe, in Dr. Rein's list. Name from *kentron*, a spur; *anthos*, flower, Gr.

Fedia olitoria, Vahl. Lamb Lettuce.

An annual weed; found on David's Island.

LIX.—COMPOSITÆ.

Ageratum conyzoides, Linn.

A weed.

Ageratum Mexicanum, Sweet.

A weed.

Eupatorium fœniculaceum, Willd. (*Artemisia tenuifolia*, Adans.)

A weed, of American origin.

Eupatorium conyzoides, Vahl.

Kleinia repens, Haw.

Bidens leucanthus, Willd.

A common weed ; named from two teeth on the seed.

Cynara cardunculus, Linn. Cardoon. Artichoke.

Cultivated in gardens. The real artichoke, *C. scolymus*, Linn., the writer did not meet with.

Cichorium Intybus, Linn. Succory or chicory.

A weed from Europe, generally diffused, but not put to any use as in Europe.

Taraxacum Dens-leonis, Desf. (*Leontodon*.) Dandelion.

A common weed ; named from the cut leaves.

Lactuca sativa, Linn. Lettuce.

Cultivated in gardens.

Sonchus oleraceus, Linn. Sow thistle.

A weed.

S. asper, Vill.

Crepis lyrata, Froel. (*Youngia lyrata*, Cass.)

A small weed.

Eclipta erecta, Linn.

A tall-growing, many-branched weed, with smooth stem and tumid joints, serrate leaves; abundant by water-courses in Pembroke Marsh. (*E. alba*, Hassk.)

Borrichia arborescens, DC. Samphire; Sea ox-eye.

Native; common to the West Indies and Florida. A yellow-flowering,

maritime shrub, with fleshy leaves, some glossy and of a bright green, some hoary and gray. They do not mark different varieties, being often found on the same plant. Flowers in April and May. (*B. frutescens*, in Lane's list.)

Baccharis heterophylla, H. B. Dogbush.

Native; abundant in Pembroke Marsh, where it flowers a little before Christmas. The ♀ flowers are a few days later than the ♂. (*B. halimifolia* in Lane's list.) A name given by the Greeks to an aromatic plant dedicated to Bacchus.

Solidago virgata, Michx. Golden-rod.

A coarse weed, very common, flowering in autumn. An American species.

S. sempervirens, Linn.

S. Mexicana, H. B.

These species, in the Southern States, affect swamps and salt marshes, but in Bermuda are met with on high ground; for example, on the battery hill, Mount Langton. Name from *solidare*, to unite, Lat., from supposed healing properties.

Erigeron Canadensis, Linn. Fleabane.

Common to the American States and the West Indies.

E. linifolius, Willd. (*Conyza ambigua*, DC.)

E. Philadelphicus, Linn.

E. quercifolius, Lam.

E. bonariensis, Linn. (*Conyza albida*, Willd.)

E., sp. not identified.

Stenactis annea, Cass. (*Erigeron annuum*, Linn.)

Aster trifolium, Linn.

Artemisia tenuifolia, Willd. Wild wormwood; Cape weed; Godet's weed; French fennel.

A weed in cultivated ground. Brought to Bermuda from Cape Francois, in San Domingo, in packages of gin flasks, about the end of the

last century, by M. Theodore Godet, who resided on Godet's Island, near Salt Kettle. (J. H. D.) Now common.

Senecio vulgaris, Linn. Groundsel.

A weed.

S. mikanoioides, Otto. Italian ivy of gardeners.

A climbing species quite naturalized in some gardens.

Dahlia superflua, Ait.

Dahlias of poor quality are occasionally found in gardens. Originally from Mexico.

Zinnia elegans, Jacq.

Cultivated in gardens.

Pyrethrum Parthenium. Common feverfew.

Same remark.

Cineraria maritima, Linn. Sea ragwort.

Cultivated in gardens.

Helianthus tuberosus, Linn. Jerusalem artichoke.

This plant is said to be cultivated in gardens, but is not common; tried in Pembroke Marsh; it grew with great luxuriance, but the tubers were hardly larger than marbles.

H. annuus, Linn. Sun-flower.

Is grown in some gardens.

Centaurea gymnocarpa, Maris and Not.

A weed.

Gazania spendens, H. K.

Cultivated in gardens.

Pluchea odorata, Cass.

Native; found also in Pembroke Marsh, but not very abundant. Grows to a tall bush.

P. purpurascens, DC.

An annual; found in Shelly Bay Swamp and by Warwick Pond. Flowers in June and September. Both are West Indian; the latter is also found in Florida.

Polymnia Uvedalia, Linn.

A coarse yellow-flowering weed; not common; found at Mrs. Ewing's.

Parthenium Hysterophorus, Linn.

A very common annual weed by roadsides.

Ambrosia artemisiæfolia, Linn.

A. heterophylla, Muhl.

Weeds in cultivated ground or by roadsides.

Xanthium echinatum, Murr. Cocklebur.

A weed in cultivated ground; common to every part of the United States.

LX.—GOODENIACEÆ.

Scævola Plumieri, Linn.

Native; common along the south shores; easily known by its white flower, apparently split on one side. Common also in the West Indies and the Southern States.

LXI.—LOBELIACEÆ.

Lobelia cardinalis, Linn.

A garden flower.

LXII.—ERICACEÆ.

Azalea viscosa? Linn., Ph.

Plants imported from Halifax, N. S., flowered very well at Mount Langton for several successive years, but were kept in a conservatory.

Rhododendron sp. Linn.

The same remark applies to the scarlet rhododendron, which, however, did not flower so freely as the azalea.

LXIII.—PLUMBAGINEÆ.

Statice Caroliniana, Wallt. Sea lavender.

Found by the margin of pools in the Walsingham tract, throwing up tall spikes of small blue flowers in September.

Plumbago Capensis, Thunb. Plumbago.

Not uncommon in gardens. It was introduced from Kew about 1832.

P. coccinea, Boiss., and *P. rosea*, Linn.

Were introduced at Mount Langton, and living, but not established, in 1877.

LXIV.—PRIMULACEÆ.

Anagallis arvensis, Linn. Red pimpernel.

A weed in cultivated ground.

Primula Sinensis, Hochst.

A garden flower.

LXV.—MYRSINÆÆ.

Ardisia acuminata, Willd.

A. humilis, Vahl.

Introduced from the West Indies in 1873 and established at Mount Langton.

LXVI.—SAPOTÆÆ.

Chrysophyllum Cainito, Linn. Star apple.

From the West Indies; in a few gardens.

Sapota Achras, Mill. Sapodilla.

From the West Indies; rather more common than the last; flowers about May; fruit July and August.

LXVII.—EBENACEÆ.

Diospyros Virginiana, Linn. Persimmon.

Introduced at Somerville some years ago and quite established. It grew also readily at Mount Langton, and becomes a nuisance by sending up suckers from the roots.

D. mabola, Roxb.

Was imported from the West Indies, but did not thrive.

LXVIII.—JASMINEÆ.

Jasminum gracile, Andr. Wild jasmine.

A remarkable example of rapid naturalization. This pretty climber was introduced at Paynter's Vale by Archdeacon Spenser, about 1840. It has now completely overrun the Walsingham tract to such a degree as to make the rocks in many places nearly impassable; flowers in June.

J. officinale, Linn., W. Common white climbing jasmine with pinnate leaves.

J. Sambac, Ait., W. White jasmine with cordate leaves.

J. fruticans, Linn. Common yellow jasmine.

All naturalized; the last flowers nearly all the year round.

LXIX.—OLEACEÆ.

Olea Europæa, Linn. Olive.

"We haue oliues grow with us, but no great store." Such is the evidence of nearly the first writer on Bermuda, in 1612. It appears sufficient to prove that the tree was then naturalized, probably from seeds sown by the crews of Spanish vessels visiting the islands or wrecked on them in the sixteenth century. It is mentioned by Smith, 1624, and in 1661 the Bermuda Company ordered them to be planted on every shore; some of those trees are still standing. The fruit is very scanty and not put to any use.

Forestiera porulosa, Poir.

A bushy tree found in the Walsingham tract; there are specimens south of the road leading to the Causeway. It flowers in December, and the fruit may be found in March. Flowers, which are minute, are polygamous, in short, axillary, amentaceous racemes. •

Ligustrum vulgare, Linn. Privet.

From an old stock found among the roots of a *Ficus elastica* at Mount Langton. A great number of plants were raised by cuttings and set out in fences as a rival to the oleander, but the plant did not come to any value. Flowers in February.

LXX.—APOCYNÆ.

Allamanda Schottii, Pohl.

Only grown under glass at Mount Langton in 1876, but appears quite suited to bear the open air in sheltered situations.

Thevetia neriifolia, Juss. French trumpet flower. (*Cebera thevetia*, Linn.)

Naturalized, and not uncommon.

Vinca rosea, Linn. Red periwinkle.

Naturalized from West Indies. Common in gardens. *V. rosea*, var. *alba* is met with less frequently.

Plumieria rubra, Linn. Frangipani.

Trees of large size are found in many old gardens, and are very ornamental. They lose their leaves in winter, and flower before the new leaf in May. Originally from tropical America.

Nerium Oleander, Linn.. Oleander; formerly called South Sea rose.

This beautiful plant, which from May to September is the greatest or-

nement of Bermuda, is said to have been introduced from Charleston, S. C., by a Mr. Lightbourn, of Paget Parish, about 1790. In the early years of the present century it was regarded as a rare exotic; now universally used for fencing purposes and as a screen from the sea winds.

Beaumontia grandiflora, Wall.

Sent from Barbadoes by General Munro, in 1874, and flowered freely in a conservatory in 1878.

Stephanotis floribunda, Pet., Thon.

Grows and flowers freely in good soil, but is not often met with. The secret of the best flowering plant at Mount Hill was *a neighboring pig-stye*.

LXXI.—ASCLEPIADEÆ.

Asclepias Curassavica, Linn. Wild ipecacuanha; in West Indies Red head or Blood flower.

Naturalized and common.

A. nivea, Linn.

Appeared spontaneously from some West India soil at Mount Langton and established itself.

*Hoya carnos*a, Br. Wax plant.

Found in gardens; originally from tropical Asia.

Stapelia maculosa. Carrion flower.

Originally from the Cape; not uncommon as a pot plant.

LXXII.—GENTIANEÆ.

Erythræa Centaurium, Pers.

A native of Britain. In Lane's list as a plant introduced.

LXXIII.—HYDROLEACEÆ.

Nama Jamaicensis, Linn.

Native; an annual weed with white or blue flower; by roadsides, but not common.

Nemophila insignis, Benth. Nemophila.

A garden flower from California; it was not found to do very well at Mount Langton.

LXXIV.—POLEMONIACEÆ.

Cobra scandens, Cav.

This beautiful climber grew and flowered luxuriantly at Mount Langton, but never matured the seed.

Strobilanthes longicaudatus.

Received from Kew, and flowered well in a sheltered place.

Dipteracanthus affinis, Nees.

This beautiful climber flowered well against a wall. Received from Barbadoes, 1873.

LXXV.—CONVOLVULACEÆ.

Quamoclit coccinea, Moench. Cypress vine.

Introduced from America; quite naturalized, although confined to gardens, where it is self-sown in great quantity. Flowers in autumn.

Q. vulgaris, Chois.

Less common and less prolific than the other.

Batatas edulis, Chois. Sweet potato.

Of very early introduction; but it is not always easy to distinguish whether the sweet potato or the common potato is meant in early narratives. It is certainly mentioned in 1653. Sweet potatoes are largely grown.

Ipomœa tuberosa, Linn.

Yellow-flowering *Ipomœa* in the Public Garden of St. George's; removed from Mr. Swainson's, where it grew with great luxuriance, running over several small loquat trees.

I. Nil, Roth. (*Pharbitis Nil*, Chois.)

The common morning glory.

I. Learii, Paxt.

Naturalized in gardens.

I. Pes-Caprae, Sweet. Seaside vine.

Native; common on the sea shores.

I. villosa, R. P.

Found in cultivated ground, probably of chance introduction.

I. Jamaicensis, Don.

I. purpurea, Lam.

Native; the ornament of the well-known "Convolvulus Cave." (*Convolvulus*, Linn.)

I. dissecta, Pursh. Noyau vine.

Introduced; common. (*Convolvulus*, Linn.)

I. sagittifolia, Pursh. (*Convolvulus sagittifolius*, Michx.)

Naturalized from America, but only found in a small marsh near Shelly Bay, where it is very abundant.

I. sidifolia Schrad.

Naturalized from the West Indies at Clarence Hill, where it runs from tree to tree.

Dichondra repens, Forst.

A common creeping weed among grass.

D. Carolinensis, Michx.

A variety of the same.

LXXVI.—BORAGINÆ.

Cordia Sebestana, Linn. Scarlet cordia.

Introduced from the West Indies; in a few gardens.

Tournefortia gnaphalodes, R. Br. Sea lavender.

Native, and common on the south shores; easily recognized by its thick heads of elongated hoary leaflets, and the scars on the branches, where preceding ones have fallen off; flowers white.

T. laurifolia, Vent.

At Mount Langton.

Heliotropium Curassavicum, Linn. Sea turnsole.

Native; found in salt marshes; may be recognized by the twin spikes of small flowers being gracefully curved over in opposite directions. The name is from *helios*, the sun; *trepo*, I turn, Gr.; the flowers being said always to turn to the sun.

Heliotropium Peruvianum, Linn. "Cherry-pie."

This fragrant and favorite plant is by no means common, and would appear not at home in Bermuda. The luxuriant growth seen in Madeira is never met with there.

Borago officinalis, Linn. Borage.

Lithospermum distichum, Orteg. Gromwell.

A seaside plant; native.

LXXVII.—SOLANÆ.

Brunfelsia Americana, Linn.

A shrub found in flower in Mr. R. Outerbridge's garden, St. George's, October, 1876. The plant was devoured by white coccus.

Datura suaveolens, Humb., Bonpl. Moon plant.

A common ornament of gardens; both single and double flowering. (*Brugmansia suaveolens*.)

D. Tatula, Linn.

Native; met with as a weed in cultivated ground in Paget Parish; flowers pale violet.

D. Stramonium, Linn. Prickle-bur.

Native and common. It is alluded to in a proclamation of 1679 as "a badd and stinking weede that beares a prickle-burr, the which when it is drie it is full of flatt black seeds, which if suffered to grow, may be very destructive to the inhabitants of these islands, by reason of the venomous and poysonfull nature thereof."

D. Metel, Linn.

D. fastuosa, Linn.

From Mr. J. M. Jones; unknown to me.

Nicotiana Tabacum, Linn. Tobacco.

The principal export of Bermuda in the seventeenth century. The legislature again in 1878 gave encouragement to the cultivation of it. The plant springs up spontaneously among the ruins of old outhouses constantly from seed left perhaps a century or two before. The current value was 2s. 6d. a lb. in 1620, which had fallen to 3d. in 1690, when it ceased to pass as currency. There is reason to believe that the Bermuda tobacco was never of good quality, and that nothing but disappointment can attend its re-introduction.

N. glauca, Graham.

A native of South America; pretty common in gardens. Easily recognized by its yellowish tubular flower, resembling that of the tobacco plant, and blue green leaves.

Physalis edulis, Linn. Cape gooseberry.

Introduced from Cape Seed, 1874. It bears fruit abundantly and nearly all the year round, and will probably soon be found in every garden. (*P. Peruviana*, Linn.)

Physalis angulata, Linn. Cow cherry; Balloon berry.

Naturalized from United States; annual; a weed in cultivated ground.

P. pubescens, Linn. Horse cherry.

Naturalized annual, distinguishable from the above by the more oval form and bluish tint of the fruit; flowers in clusters. (*Physalis hirsuta*, Dun.)

P. lanceolata, Michx. In Lane's list.

Naturalized perennial.

Capsicum annuum, Linn. Guinea pepper; Chillies.

C. frutescens, Linn. Spanish pepper.

Both commonly grown in gardens.

S. torvum, Sw., *id.*

A weed.

S. aculeatissimum, Jacq. Cockroach berry.

Encouraged in waste places, notwithstanding its reputed very poisonous qualities, for its beautiful scarlet fruit.

S. nigrum, Linn. Nightshade.

A weed.

S. nodiflorum, Jacq.

S. tuberosum, Linn. Irish potato.

"Certain potato roots sent from England" are mentioned in the year 1613; "abundance of white, red, and yellow colored potatoes" are mentioned by Smith in 1623. There seems no doubt, therefore, that this plant, introduced into England from Peru in 1597, found its way to the Somers Islands at a very early date, although it is not always easy to distinguish it in the narratives from *Batatas edulis*, the Spanish or sweet potato. It is now a principal article of commerce. The exports in 1876 reached 2,260 tons (33,099 barrels).

S. ovigerum, Dun. Egg-plant.

Cultivated in gardens.

S. Lycopersicum, Linn. *Lycopersicum esculentum*, Mill., *id.* Tomato.

This plant has become a staple of cultivation in Bermuda since the emancipation of the slaves. The exports reached 672 tons in 1871, but fluctuate much with the seasons.

Lycium vulgare, Dun.

Found on David's Island; originally from Europe.

Petunia acuminata, Graham. White petunia.

Varieties single and double are cultivated. *P. acuminata*, Graham (white), and *P. phænicea*, Juss. (violet), are common.

Nicandra physaloides, Gærtn.

A blue-flowering plant found by Lane near the commissioner's house, Ireland Island. Native of Peru.

Cestrum Parqui, Linn.

Introduced from Cambridge, Mass., 1874, and quite established at Mount Langton, where it flowered profusely.

LXXVIII.—SCROPHULARINEÆ.

Maurandia Barclayana, Bot., Reg.

M. semperflorens, Jacq.

Naturalized, and found clothing a great extent of moist walls at Mount Langton.

Lophospermum erubescens, Don.

An ornamental creeper, common in gardens; a native of Mexico.

Veronica agrestis, Linn. Speedwell.

V. arvensis, Linn.

V. peregrina, Linn.

Weeds; probably of American origin, but also European.

Buddleia Neemda, Roxb. Snuff plant.

Naturalized, and forming hedges in some places. From a proper name.

Capraria biflora, Linn. Tea.

This plant is found near the military police station and along the road to Prospect. Probably of late introduction from the West Indies.

Herpestis Monniera, HBK.

Found in wet ground about the race-course near Shelly Bay.

Linaria Elatine, Desf. Toad-flax.

L. vulgaris, Mill.

Russelia juncea, Zuccar. Heath.

An exotic from Mexico; quite naturalized and common in gardens.

Verbascum Thapsus, Linn. Mullein. Dock leaves.

A conspicuous weed, naturalized from Britain. The woolly leaves are used in Bermuda for cleaning purposes. It is mentioned by A. Michaux, 1803.

LXXIX.—GESNERIACEÆ.

Achimenes sp. ?

In gardens.

Gloxinia sp. ?

In gardens.

LXXX.—BIGNONIACEÆ.

Crescentia Cujete, Linn. Calabash tree.

Of early introduction; few young trees are to be found, but old ones are pretty numerous. The shells of the fruit are used for vessels. At Walsingham is the celebrated "calabash tree" referred to in one of Thomas Moore's poems.

Tecoma pentaphylla, DC. White cedar.

There are two varieties, one with entire leaves, the other with 3.5 leaflets on the same stalk, the flowers being undistinguishable, being exceedingly ornamental; the tree is often met with.

T. Stans, Juss. Trumpet flower.

A standard tree, with leaves impari-pinnate; leaflets 5-7, bearing abundant bright yellow flowers with narrow purple stripes.

T. radicans, Juss. Red trumpet flower.

Climbing red tecoma; common on houses.

T. Capensis ? G. Don.

Orange-flowering climber at Mount Langton.

Bignonia capreolata, Linn.

Introduced at Mount Langton from Cambridge, Mass., 1874.

LXXXI.—ACANTHACEÆ.

Graptophyllum versicolor, Hort. Caricature plant.

Common in gardens.

Justicia alba, Roxb. Large white justicia.

At Bishop's Lodge and elsewhere.

Justicia lucida, Andr.

Common in gardens; almost a weed.

J. Ecbolium? Linn. Blue justicia.

In gardens; not common.

Cyrtanthera rosea, id. Hort.

In gardens at St. George's and at Mount. Langton, where it was brought from Ireland in 1874.

Eranthemum Andersonii, Andr.

E. pulchellum.

From Trinidad, 1875; they were planted out, and appeared to bear the open air.

Thunbergia, sp. White thunbergia.

White and yellow; common in gardens.

Fittonia aryncara, Coem.

Imported 1874. The heat and moisture of Bermuda appeared very suitable to this plant, but it was only grown in a conservatory.

LXXXII.—VERBENACEÆ.

Verbena multifida, R. P. White verbena.

Other ordinary garden species are cultivated. The white is the most common.

Stachytarpheta Jamaicensis, Vahl. Vervain.

Native or naturalized; a common weed, and reputed to possess great medicinal properties, especially in the treatment of yellow fever, now very rarely known in Bermuda.

Phryma leptostachya, Linn.

A weed of American origin.

Lippia nodiflora, Rich.

L. micromera, Schauer.

L. reptans, HBK. Godet's weed.

Aloysia citriodora, Orteg. Sweet verbena.

The sweet verbena is found difficult to propagate, and is by no means common in Bermuda, although plants of considerable size are met with.

Lantana Camara, Linn. Red sage.

Naturalized and abundant. It was introduced from Madeira about 1819, and formerly called Madeira sage = *L. aculeata*, Linn.

L. crocea, Jacq. Prickly sage.

Less common; flowers more yellow. It was brought from Madeira in 1818.

L. odorata, Linn. Common sage.

Introduced from the Bahamas by Colonel Spoffoth toward the end of the last century, with the idea that it would be good for firing, which it is not. It is now the pest of Bermuda, overrunning woods and pastures, and permitted by the supineness of the inhabitants to render thousands of acres of land valueless.

Citharexylon quadrangulare, Linn. Fiddlewood.

Naturalized and common, although said to have been first introduced by Archdeacon Spenser at Paynter's Vale, about the year 1830.

Duranta Plumieri, Linn. Pigeon berry.

Naturalized and common. The native species is unarmed. Some plants imported from Maderia in 1873 proved to be spiny, and the flowers somewhat larger and of a deeper blue than the common species.

Callicarpa ferruginea? Sw. Turkey berry.

One of the most ornamental of native plants, from its large masses of magenta-colored fruit. Found chiefly in the Walsingham tract; flowers in June.

Volkameria aculeata, Linn. Prickly myrtle. (*Clerodendron aculeatum*, Gr.)

Naturalized at Spanish Point and on Ireland Island, but not very often met with.

Clerodendron capitatum.

Wild around Pembroke workhouse, formerly the rectory; probably introduced.

Avicennia nitida, Linn. Black mangrove.

Native; usually accompanies the mangrove proper; there is a grove of trees on comparatively dry soil at Shelly Bay. The popular name, black mangrove, is derived from the color of the wood. (*A. tomentosa*, Linn., in Lane's list.)

LXXXIII.—LABIATÆ.

Ocimum Basilicum, Linn. Basil.

Introduced in 1616, and still cultivated.

Coleus, sp.

Common in gardens. The name comes from *koleus*, a sheath, Gr., from the union of the stamens.

Mentha viridis, Linn. Garden mint.

M. rotundifolia, Linn. Wild mint.

By roadsides.

M. arvensis, Linn. Marsh mint.

Common in Pembroke marsh.

Pycnanthemum muticum, Pers. Horse mint.

Calamintha Nepeta, Linn.

Melissa officinalis, Linn. Common balm.

M. Calamintha, Linn.

Nepeta Cataria, W. Catmint or Catnip.

Common in Pembroke marsh.

Salvia scrotina Linn. *Monogynia*.

S. coccinea, Linn.

Naturalized, and common about Mount Langton and elsewhere. (Probably the *S. occidentalis* of Lane's list.)

S. splendens, Ker. Scarlet salvia.

Grows with great luxuriance in gardens; also a blue variety.

Sideritis Romana, Linn.

From Dr. Rein's list.

Scutellaria purpurascens, Swartz.

Lamium amplexicaule, Linn. Dead nettle.

Common by roadsides in Hamilton.

L. purpureum, Linn.

A weed; also common.

Marrubium vulgare, Linn. Horehound.

Leonurus sibericus, Linn.

Naturalized ; occasionally springs up spontaneously.

Leonurus Cardiaca, Linn.

Lavandula spicata, Linn. Lavender.

In gardens.

Thymus vulgaris, Linn. Thyme.

Rosmarinus officinalis, Linn. Rosemary.

LXXXIV.—PLANTAGINEÆ.

Plantago lanceolata, Linn. Rib-grass.

P. major, Linn.

P. Virginica, Linn.

Roadside weeds.

LXXXV.—NYCTAGINEÆ.

Boerhavia erecta, Linn. Hogweed.

A weed found in cultivated ground at Paynter's Vale; minute apetalous flowers of pale pink. Probably introduced. Common to the West Indies and Southern States; flowers in September.

Mirabilis Jalapa, Linn. Marvel of Peru.

M. dichotoma, Linn. Four o'clock.

Both species are naturalized and almost wild; by roadsides.

Bougainvillea spectabilis, Willd.

Sent to Governor Lefroy, from Gibraltar, in 1874, by Colonel Laffan, R. E., afterward governor. This gorgeous plant has established itself in Bermuda with great rapidity, and is becoming one of its greatest ornaments. It flowers from November to May.

B. glabra.

At Clarence House; imported from the West Indies by Admiral Key.

LXXXVI.—PHYTOLACCEÆ.

Suriana maritima, Linn. Tassel plant.

Native and common along the south shores; flowers in May. Common all over the West Indies and tropics generally.

LXXXVII.—POLYGENÆ.

Polygonum acre, HBK.

An aquatic weed abundant in ditches in Pembroke marsh. Common in West Indies and Southern States. From *polus*, many; *gonu*, knee; Gr., in allusion to the joints.

Coccoloba uvifera, Linn. South Sea or Seaside grape.

Common; probably native. It grows to a very large size, especially on the south shore behind Ardshields, in Paget Parish. (Girth of largest tree, 6 ft. 4 in.) The fruit is sometimes made into a preserve. Common in the West Indies. The name is from *kokkos*, fruit; *lobe*, a lobe; Gr., being three-lobed.

C. platyclada, Hook.

This plant is common in gardens, and grows to a considerable size, with a thick, woody stem. Originally from the Solomon Island. It flowers in December and January.

Rumex Acetosella, Linn. Common sorrel.

Met with in pastures.

R. obtusifolius, Linn. Dock, *loc.* Rhubarb.

This coarse weed is found in waste places.

Rheum Rhaponticum, Linn. Rhubarb.

Roots procured from the United States in 1872 were a failure, and soon died out.

Antigonon leptopus, Hook. & An. Coral plant.

A native of Mexico, much cultivated in the West Indies for ornament. Introduced at Mount Langton from Barbadoes.

LXXXVIII.—AMARANTACEÆ.

Amarantus spinosus, Linn.

A weed in cultivated ground; common in Southern United States. From a privative, Gr.; *marino*, I wither; allusion to the lasting character of the flower.

A. hybridus, Linn.

Also an American species.

Iresine Herbstii, Hook.

To be found in gardens.

LXXXIX.—CHENOPODIÆ.

Chenopodium anthelminticum, Linn. Goosefoot family.

A coarse, strong-smelling, perennial weed; probably native; found among rocks and roadsides. Common in West Indies and United States. From *kén*, Gr., a goose, and *pous*, foot; in allusion to the form of the leaves.

C. ambrosioides, Linn.

An annual weed in cultivated ground; probably from West Indies. Native of Mexico.

C. album, Linn.

An annual weed in cultivated ground; from Southern United States (not West Indies).

Atriplex cristata, H. B. (*Obione cristata*, Moquin.) Sea orache.

An erect herbaceous plant common along the north shores, *e. g.*, near the ducking stool, where its spikes of minute male flowers are conspicuous in August and September. The female flowers, which are sessile in the axils of the branchlets, very minute, star-shaped, and of a grayish green color, appear rather later, in small groups of 2-4 flowers. The plant generally is scurfy, of grayish tint, 6'' up to 2' high. From a privative, Gr., and *trafein*, to nourish.

Salicornia fruticosa, Linn. Var. Marsh Sampphire; Glasswort.

Abundant in salt marshes; stem prostrate or creeping; branches succulent, leafless, cylindrical, erect, jointed, 6 in. to 1½ ft. high; flowers in May. *S. ambigua*, Michx., in Rein's list. *S. herbacea*, Linn., in Lane's list. From *sal*, salt; *cornu* a horn, Lat.

Beta vulgaris, Linn. Beetroot.

In gardens, and cultivated, but to no great extent, for exportation to New York.

XC.—BASELLÆ.

Boussingaultia baselloides, HBK.

Grew luxuriantly over a veranda at Mount Langton, but was accidentally destroyed. I afterwards found it at a cottage on David's Island.

XCI.—LAURINEÆ.

Persea gratissima, Gaertn. Avocada or Alligator pear.

Common, and very fine. It is more prized by Bermudians than any other fruit. A tree at Mount Langton, planted about 1835, is now the

finest in the island, and occasionally bears "peers" (*loc.*) of nearly 2 lbs. weight. It is much infested by white coccus. Flowers about March. The fruit is in season from August on to October, and sometimes later. *Persea Indica*, the venhatico of Madeira, was tried but failed. The name *Persea* is applied by Greek writers to another tree.

Laurus nobilis, Linn. Sweet bay tree.

Found in gardens and old plantations.

L. Carolinianum? Poir.

A tree of considerable size by the roadside west of Paget Church. Flowers in April.

XCII.—PROTEACEÆ.

Leucodendron argenteum, Br. Silver tree.

Many young plants were raised from seed received from the Cape of Good Hope, but none lived beyond a few months.

XCIII.—URTICACEÆ.

Pilea scrpyllifolia, Wedd. Lace plant, or Artillery plant.

Common in gardens; introduced.

Behmeria cylindrica, Willd. False nettle.

Native, and abundant in Pembroke marsh; may be recognized by a general resemblance to a large nettle, especially in the flower found in Florida.

Urtica dioica, Linn. Common nettle.

U. urens, Linn. Small stinging nettle.

U. purpurascens, Nutt.

Distinguishable by the bold notches or saw-teeth on the leaves; all weeds; probably from Europe. The name is from *uro*, I burn, Lat.

Parietaria debilis var. *Floridana*, Nutt. Pellitory.

Found on the walls of the Public Garden, St. George's. From *paries*, Lat., a wall.

XCIV.—MORACEÆ.

Ficus Carica, Linn. Common fig. .

The wild fig is nearly exterminated in Bermuda, although a few trees may still be found among the rocks, chiefly in the Walsingham tract. It is a small purple variety, with very deep-cleft 7-lobed leaves. Figs are not among the fruits mentioned by Jourdan or Strachey in 1610.

Rev. Lewis Hughes in 1615 rather refers to them as plants which may be introduced than as if they existed; on the other hand he speaks of "fences of figge and pomegranite trees" in 1621, and they are mentioned in a proclamation of very early date, probably 1616. In 1623 they were abundant enough to be dried for food. This abundance continued down to the present century. It seems probable that they were among the fruit trees introduced by the first settlers in 1612 or 1616, but they may have found the tree already naturalized from seed left by earlier visitors. There are several varieties of fig cultivated at St. George's, the only place where the fruit is tolerably abundant. It did not succeed at Mount Langton, where many trees of different varieties from the United States were planted about 1872.

F. elastica, Roxb. India-rubber tree.

Introduced from South America by the lady of Sir Hildebrand Turner, about 1826; now common. It grows to a very large size; a tree in Hamilton is 12 feet in girth.

F. aurata, Miq.

Introduced at Mount Langton 1875, and very healthy in 1877.

Morus rubra, Linn. Red mulberry.

There is a large tree, wild, among the rocks at Walsingham, and this is the species commonly found in gardens; whether *M. nigra*, the common mulberry, is to be found, is uncertain. The mulberry is mentioned in the earliest narratives, but the writers gave this name to the fruit of *Conocarpus erectus*. The Bermuda Company sent out mulberry seeds in 1616.

M. multicaulis, Perrot. Silkworm mulberry.

Introduced from America by Mr. Daniel Vaughan, about 1841, for feeding silkworms, and planted in many places.

M. macrophylla, Hort. Paper mulberry.

Artocarpus incisa, Linn. Bread fruit.

Introduced at Mount Langton 1874. One or two young trees appeared likely to thrive. Name from *artos*, bread; *karpos*, fruit, Gr.

A. integrifolia, Linn. Jack fruit.

To be found in the garden at Par-la-ville.

Maclura aurantiaca, Nutt. Osage orange.

Introduced by Captain Rollo, Forty-second Regiment, about 1851, by seed from the Mississippi; now naturalized, but uncommon.

M. Xanthoxylon Endl. Tamarind plum.

To be found in the gardens of Mr. H. Trimingham and Mr. Richardson, Paget Parish. Introduced from the West Indies about 1865. The fruit is ripe in September.

XCV.—CELTIDÆ.

Celtis Missisippiensis? Bosc. Nettle tree. Cherry.

Native, but not common. There is a large tree near the Church Cave, and several about the parsonage, Southampton. Flowers in March. (*C. occidentalis*. Linn.?)

Sponia Lamareckiana, Decaisn. No local name discovered.

Native. This plant forms the underwood of a large part of the Walsingham tract, especially near Paynter's Vale, and grows to a straggling tree of considerable size, the largest 38 inches round. It is easily recognized by the roughness of the leaves and shoots. The flowers, which are apetalous, very minute, and obscure in the axils of the leaves, will be found in June. It occurs in the Bahamas and West Indies generally.

XCVI.—PLATANACEÆ.

Platanus occidentalis, Linn. American plane.

Grows well in Bermuda, and is occasionally found about houses. The name is from *platys*, ample, Gr., in allusion to the shade.

XCVII.—MYRICEÆ.

Myrica cerifera, Linn. (*M. punctata*, D. C.) Candleberry myrtle.

Is common in some parts of the island, especially in the grounds of Mount Langton and in Devonshire marsh; it has a habit of growing immediately under and among the roots of the cedar trees. It flowers in March. Probably introduced by natural causes. Name from *myryké*, Gr.; of no application to this species.

XCVIII.—CASUARINEÆ.

Casuarina equisetifolia, Forst.

Was abundant a few years ago on Ireland Island; now reduced to one or two trees in the grounds of the captain superintendent; generally taken for tamarisk. Probably introduced from the West Indies, but originally from the South Seas. Name from a slight supposed resemblance of the foliage to the plumage of the cassowary.

XCIX.—SALICINÆ.

Salix Babylonica, Linn. Weeping willow.

Introduced by Lady Hildebrand Turner, about 1830, and now very common in low grounds.

S. Humboldtiana, Willd. Caraccas willow.

Evidently, from the local name, introduced from Caraccas, and now frequently seen. It grows very readily and rapidly in moist ground.

C.—EUPHORBIACEÆ.

Poinsettia pulcherrima, Gra.

Naturalized and common, growing with great facility from cuttings. Originally from Mexico. This gorgeous plant flowers in November, and for some weeks becomes one of the principal ornaments of Bermuda. Name from Poinsette, a Mexican traveler.

Phyllanthus Niruri, Linn.

An annual weed in gardens; easily known by the minute flowers along the under side of the branches; grows about 1' high. Found in all tropical countries.

Jatropha podagrica, Hook. Gouty-stalked atropa.

Introduced by Mr. S. S. Ingham, 1875.

J. multifida, Linn. Coral plant.

Common in gardens; originally introduced from West Indies. From *iatron*, Gr., a remedy; *fugo*, I eat.

J. Curcas, Linn. Physic nut.

Native; to be found in the Walsingham tract. Flowers in June. It is naturalized in all tropical countries.

J. panduræfolia, Andr., or *hastata*, Jacq.

This beautiful species, with deep rose flowers, may be found in Mr. Reid's garden, Hamilton. Flowers in April. A native of Cuba.

J. manihot, Linn. Cassava.

Cultivated as early as 1621, being mentioned by Rev. Lewis Hughes as 'likely to prove a great blessing of God.' Probably then recently introduced from the West Indies. It is still very generally grown, custom having connected the making of "cassava pies" and "cakes" with Christmas festivities, but cassava bread does not enter materially into the diet of any class.

Aleurites triloba, Forst. Otaheite walnut.

Common, and naturalized. The local name would point to its having reached Bermuda from the East Indies, probably about the time of its introduction into the West Indies. From *aleiar*, Gr., flour, in allusion to its appearance.

Cicca disticha, Linn. Otaheite gooseberry.

Naturalized, but not common. There is a large tree at Mouut Langton. Flowers in May and June; loses its leaves for a short time in winter. (*Phyllanthus longifolius* Jacq.)

Ricinus communis, Linn. Castor-oil plant. Palma Christi.

Common, and completely naturalized, if not native. It appears to be the plant mentioned by Smith as the redweed, in 1623, and was extensively cultivated as the "oyl seed" about 1632. No use is at present made of the fruit. Dr. Pusey's identification of this very quick growing plant with Jonah's gourd, if not quite satisfactory, is at least interesting.

Croton maritimum, Walt.

Native, and common along the south shore. This plant is American and not West Indian, extending from Florida along the Carolinas.

Croton, sp.

Several ornamental varieties were introduced at Mount Langton, 1872-76, viz, *C. angustifolium*, Hart.; *C. discolor*, Rich.; *C. pictum*, Hort.; *C. teneum*, Mully.; *C. variegatum*, Forsk. (previously cultivated); *C. undulatum*, *C. cornatus*, Vell. These all appear to thrive in the open air, and will probably become common in gardens hereafter.

Acalypha tricolor, Hort.

Introduced from Barbadoes, 1874; grew well in the open air at Mount Langton; originally East Indian.

Hura crepitans, Linn. Sandbox tree.

There is an old tree in the Public Garden, St. Georges, and it is not uncommonly met with elsewhere. It grows very readily; loses its leaves in winter, recovering them in May; flowers in August.

Pedilanthus tithymaloides, Poit. Arsenic plant. Slipper plant.

Common in gardens, notwithstanding its reputed poisonous properties, its vivid green being pleasing to the eye; West Indian. From *pedilon*, Gr., a slipper; *anthos*, a flower.

Euphorbia buxifolia, Lam., or *glabrata*, Sw.

Common on the rocks along the sea-shores; may be known by the pointed oval leaves overlapping each other along the stem.

E. maculata, Linn.

An annual weed, growing in flat circular patches; of purplish tint.

E. prostrata, Ait.

An annual weed, differing little from *E. maculata*.

E. hypericifolia, Linn.

A tall, erect, annual weed, common in cultivated grounds.

E. heterophylla, Linn. Joseph's coat.

Annual or biennial; grows to a height of 3'. The red patch on some of the upper bracts makes it a conspicuous plant.

E. Peplus, Linn.

Annual weed, of universal diffusion; probably originally from Europe.

E. Jaquinæflora, Hook.

Introduced from Madeira, 1874, and grows freely.

The negro name *Tittimelly* is applied indiscriminately to all these Euphorbias.

E. Candelabrum, Trem.

A fine plant at Bishop's Lodge, from which many cuttings have been taken.

E. splendens, Bojer.

Found in many gardens.

Mercurialis annua, W. Mercury, or Mockery.

Introduced from Europe; a very common weed.

CI.—PIPERACEÆ.

Peperomia obtusifolia, Dietr.

Native, and abundant in the Walsingham tract, where its dark, glossy, succulent leaves and spikes of minute flowers are an ornament to the rocks wherever there is any shade or moisture. A native of the West Indies.

CII.—CERATOPHYLLÆ.

Ceratophyllum demersum, Linn. Ditchweed.

Common in Pembroke marsh, and to northern temperate and tropical zones of all climates.

CIII.—ARISTOLOCHIACEÆ.

Aristolochia trilobata, Linn. Birthwort; Dutchman's pipe.

At Mount Langton and at the Naval Hospital, Ireland Island. Introduced from the West Indies. The name has reference to its supposed virtues in parturition.

CIV.—JUGLANDEÆ

Juglans nigra, Linn. Black walnut.

One or two specimens are extant at Par-la-ville. The name comes from *Jovis glans*, Lat., the nut of Jove.

CV.—CUPULIFERÆ.

Quercus alba? Linn.

There was a healthy young tree at or near Par-la-ville, Hamilton, in 1875.

The following species, received from the Botanical Gardens, Cambridge, Mass., were planted in the grounds of Mount Langton in 1872, but with little promise of permanency: *Quercus aquatica*, Walt.; *Q. Catesbæi*, Michx.; *Q. cinerea*, Michx.; *Q. nigra*, Linn. The plants lingered until 1877, but made no growth.

GYMNOSPERMÆ.

CVI.—CONIFERÆ.

Juniperus Bermudiana, Lun. Bermuda cedar. (*J. Barbadosensis*, Linn.)

The characteristic native forest tree of the Bermudas, which still clothes a very large part of the entire area of the islands. It owes its universality and its success in the struggle for existence apparently to its power of withstanding the gales of wind for which the Bermudas have always been famous. This power again is due to the little resistance offered by the foliage, to the hardness and toughness of the wood, and to the remarkable power possessed by the roots of holding on to the rocks and penetrating their interstices. It can also extract nourishment from almost pure lime, such as coral sands newly thrown up. Cedar roots are said to exist *in situ* in places along the outer reefs. They have certainly been found at 3 to 5 fathoms depth in Elies Harbor and in Hamilton Harbor. Cedar wood in a condition approaching lignite was found at a depth of 47 feet below low-water mark in dredging for a bed for the Bermuda dock. The length of time necessary for a subsidence of 47 feet indicates a very long prevalence of the same conditions. The cedar formerly attained a very great size; planks of 32

inches width are mentioned in the records of the seventeenth century; there is still standing in Devonshire church-yard the shell of an old tree 59 inches in diameter, and a portion of a trunk 42 inches wide was found below the surface of Pebmroke Marsh in 1872. This tree must have been 6 or 7 feet in diameter. The largest trees now standing and to all external appearance sound are on Long Bird Island and at Daniel's Head; they are about 11 feet in circumference. Owing to the total neglect of forestry, no attempt ever being made to thin the abundant seedlings which spring up round every pistillate tree, the thickets are much too crowded, and a great proportion of the trees become stag-headed early. Really valuable cedar timber is becoming scarce as the better soils are more and more brought under cultivation, but there is still a great deal suitable for cabinet work, for which its beauty and fragrance recommend it; and birds'-eye pieces are in considerable demand. The cedar flowers in March, when the staminate trees put on a golden appearance, which adds much to their beauty.

Thuja pyramidalis, Tenor.

There was a tree of some years' standing at Mr. Henry Darrell's, Hamilton, and several promising young plants at Mount Langton.

Araucaria Bidwellii, Hook. The Bunya Bunya of Queensland.

Two plants received from Trinidad in 1875 were well established at Mount Langton in 1877.

A single small *Pinus* at Mr. Shaw Wood's, Spanish Point, was the only other *Conifer* known to the writer until a number of species were received from Cambridge, Mass., and planted out in November, 1874. Of these the following were living in March, 1877, but the majority had made little growth:

Biota Nepaulensis, Endl.

orientalis, Don.

Cupressus funebris, Endl.

Lawsoniana, Murr.

macrocarpa, Hartw.

torulosa, Lamb.

Pinus longifolia, Lamb.

inops, Ait.

pinea, Linn.

Sabiniana, Dougl.

Sequoia gigantea, Torr.

Thuja gigantea, Nutt. Promising well.

T. plicata, Lam.

Torreya Californica, Torr.

Cryptomeria elegans, Veitch. Promising well.

The conclusion must be that few of the fir tribe will grow in Bermuda. The Bahamas species, *Pinus Bahamensis*, Griset., has, however, not been tried. A number of cones were procured, but they had all shed their seed.

CVII.—CYCADEÆ.

Cycas revoluta, Thunb. Sago palm.

This plant is to be found in nearly all old gardens, and was probably introduced from the West Indies, although a native of India. No use is made of the starch it produces.

ADDENDA.

The following orders have been accidentally omitted in their proper sequence:

TAMARISCINÆ. (To follow order XLII.)

Tamarix Gallica, Linn. Spruce.

Introduced from Europe; now common along the shore roads; is often planted as a screen.

TETRAGONIACEÆ. (To follow order LII.)

Tetragonia expansa, Ait. New Zealand Spinach.

Cultivated as a vegetable for the table.

GENTIANÆ. (To follow order LXXI.)

Erythræa Centaurium, Pers.

Introduced. (Lane.)

MONOCOTYLEDONS.

I.—CANNACEÆ.

Canna Indica, Linn. Indian shot.

Naturalized, and common in gardens.

C. coccinea, Ait.

Common in gardens.

C. lutea, Ait. Yellow canna.

C. edulis, Ker. Tous-les-mois.

Cultivated to a small extent for the market on St. George's and David's islands; formerly more extensively grown.

Maranta arundinacea, Linn. Arrowroot.

Introduced toward the end of the last century. The exports, which reached 90 tons in 1844, now rarely amount to one-fourth of that quantity simply because other crops are found less exhausting to the soil, and more remunerative. Bermuda arrowroot, however, is still unrivaled in quality. From 15 to 20 lbs. of the starch are made from 100 lbs. of the root.

II.—ZINZIBERACEÆ.

Zingiber officinale, Rosc. Ginger.

Was easily raised at Mount Langton from West Indian roots.

Alpinia nutans, Rosc. Shell plant; Ginger.

Naturalized and common in plantations. (*Renealucia occidentalis*, Gr.) Native of the West Indies and Central America.

Hedychium speciosum? Wall.

From Madeira. Flowered at Mount Langton; originally from the East Indies.

III.—MUSACEÆ.

Musa paradisiaca, Linn. Plantain.

Not much grown in Bermuda. "Plantanes" are mentioned as early as 1621, and were probably among the first vegetable importations from the West Indies.

M. sapientum, Linn. Banana.

There are four well-marked varieties of banana produced in Bermuda, where it is extensively cultivated.

(1.) The red banana (*M. var. rosacea*, Jacq.), which is scarce. Owing to the prevalence of high winds, it can only be grown in well-sheltered places, and is about twice as long as any other species in producing fruit.

(2.) The "old Bermuda banana," a tall-growing variety, of very fine quality; now rarely met with.

(3.) The "thumb banana," which is by far the best, although very small, from its subacid flavor and dryness of substance.

(4.) The "dwarf banana" (*M. Cavendishii*, Paxton,) which is the variety commonly cultivated, and occasionally produces bunches of 80 lbs.

weight. These bananas flower and ripen fruit all the year round; but there is considerable difference in the time it takes. A plant flowering in April, with the summer before it, will produce a bunch fit to cut in 90 or 100 days; a plant flowering in November, with the winter before it, will take 150 or 160 days.

It is almost the only fruit always procurable in Bermuda, but the growth is too much left to chance, little or no horticultural skill being applied to it.

Strelitzia Reginae, Ait. Crane's bill.

To be found in many gardens.

IV.—BROMELIACEÆ.

Ananassa sativa, Mill. Pineapple.

The pineapple was extensively cultivated in Bermuda in the seventeenth century, and is frequently referred to the Records. Its complete disappearance concurs with other indications to suggest that the climate has undergone a change. The mean temperature of Bermuda is much below that of the Bahamas, where they are so largely grown. Several plants were set out in Mount Langton Garden in 1875, but came to nothing, very possibly, however, from not being fresh enough, from insufficient manuring, or for want of skill.

Billbergia farinosa, Hort., and *B. tinctoria*, Mart.

Sent from the Botanic Gardens, Cambridge, Mass., 1874. Failed to establish themselves.

V.—ORCHIDÆ.

Spiranthes brevilabris, Lindt. (Q. *S. apiculata*?)

The only native orchid, now tolerably abundant in Devonshire and Pembroke marshes, where it flowers in May; the species is not fully ascertained. Dr. Rein calls it *S. tortilis*, but remarks that he only saw two specimens.

Several common West Indian orchids have been introduced from time to time, and occasionally flower, *e. g.* *Oncidium Papilio*, Lindl., at Cavenish; others at Clarence Hill. The vanilla plant, *Vanilla planifolia*, was imported from Trinidad in 1872, but made little growth, and had not flowered in 1877.

VI.—IRIDÆ.

Iris violacea, Sweet. Iris.

I. Virginica, Linn.

Sisyrinchium Bermudiana, Linn., *loc.* Bermudiana.

Native, and universal; classed by Bentham also among native Brit

ish plants; the flowers, which begin to appear in April, are as dear to the Bermudian as the primrose to the Englishman. (*S. anceps* in Lane's list; *S. alatum*, Hook.)

VII.—DIOSCOREÆ.

Dioscorea lutea, Mey. Yam.

The yam is grown in Bermuda, and usually produced at fruit and flower shows, but is rare and does not enter into the ordinary diet of any class of natives. (*D. sativa*, Linn.)

VIII.—NAIADÆ.

Ruppia maritima, Linn. A marsh weed.

Zostera marina, Linn. Sea-wrack; Grass-weed.

Found in shallow sea-water, but not properly a sea-weed.

IX.—PALMÆ.

Sabal Palmetto, Lodd, or *Chamærops Palmetto*, Michx. Palmetto.

Native, and universal; originally American, not West Indian. The Palmetto furnished the first settlers with a sweet fruit of which they published exaggerated praises; with a vegetable obtained by cutting out the heart of the young leaves; with an intoxicating beverage they called *bibey*; and with covering for their cabins, and even their churches. Hence it is very frequently mentioned, and numerous laws were passed for its preservation. There are trees of 40 to 50 feet high. The leaves are still extensively used for making plat, which was formerly exported. We learn from Raynal that it was fashionable in Europe in the last century. Fans and many fancy articles are also made from them, but the present inhabitants are not sufficiently industrious to make them of commercial value. Flowers in June and July.

S. Adansoni, Guer. Small thatch, or Dwarf palmetto.

Also American, and seldom to be found. It was formerly common and still occurs near Paynter's Vale.

S. Carat and *S. Mucini* were planted at Mount Langton with promise of permanence.

Oreodoxa oleracea, Mart. Cabbage palm.

Introduced. Five conspicuous trees, called the sisters, near Hamilton, attract the attention of every visitor; there are many others.

Astrocaryum aureum, Gr. and Wendl. Gru-gru, or Gri-gri.

Introduced; not common. There are two fine specimens at Mount

Langton; flowers in June and July, with a strong odor, very disagreeable to many persons. Bermuda is probably the most northern locality of this palm.

Cocos nucifera, Linn. Cocoa nut.

Introduced. The trees are not numerous, and the fruit, although fully formed, is not brought to perfection. It does not occur on sandy beaches, and is not mentioned in any early accounts.

Phoenix dactylifera, Linn. Date palm.

Specimens are not uncommon, but many of them being isolated trees, either staminate or pistillate, the fruit is rarely seen. It is, however, produced, and ripens in St. George's.

Rhapis flabelliformis, Linn.

This pretty little Japanese palm is common in gardens and very readily propagated.

In addition to the above the following were introduced at Mount Langton from the West Indies, and apparently established: *Thrinax Barbadensis*, Todd; *Thrinax elegans*, Hort, Lindl; *Areca Catechu*, Linn.; *Hyophorbe Vershaffelii*, Wendl.; *Livistona Mauritiana*, probably *Chinensis*, Mart.; *L. rotundifolia*, Hort., Lindl.

The following were tried but came to nothing: *Caryota Cummingii*, Lodd.; *Martinezia caryotæfolia*, H. B.; *Phytelephas macrocarpa*, R. P.; *Pritchardia Pacifica*, Seem.

X.—PANDANÆ.

Carludovica palmata, R. P.

Introduced at Mount Langton in 1872 from the West Indies, and established.

Pandanus utilis, Borg. Screw-pine.

At Mount Langton and elsewhere.

Pandanus odoratissimus, Linn.

Found in the garden of Mr. Saltus. A native of Mauritius.

Pandanus Veitchii, Lem.

Introduced from England, 1874, and established at Mount Langton.

XI.—AROIDEÆ.

Richardia Æthiopica, Kth. Guinea yam, or arum.

Common in gardens.

Dieffenbachia Seguine, Schott. Dumb cane.

Introduced at Mount Langton from the West Indies in 1874. It quite established itself.

Anthurium cordifolium, Kth.

The same remark.

Philodendron lacerum, Schott.

The same remark.

Colocasia esculenta, Schott. Eddoe.

Cultivated and eaten by the colored natives to a small extent.

Caladium. Bleeding heart.

Many ornamental varieties, such as *C. maculatum*, Todd; *C. bicolor*, Vent.; *C. chantini*, Linn.; *C. argyritea*, Lank, &c., were cultivated in the conservatory, Mount Langton, and plants are not uncommon in the island.

Lemna minor, Linn. Duck weed.

L. trisulca, Linn.

Amorphophallus. Snake plant.

The local name is suggested by the mottled appearance of the tall stem, like the skin of a snake. Individuals are occasionally brought up from the West Indies, but it is a plant of Indian origin.

XII.—TYPHACEÆ.

Typha angustifolia, Linn. Catstail.

Native of West Indies, and as *T. latifolia* var. of Florida.

XIII.—LILIACEÆ.

Asparagus officinalis, Linn. Asparagus.

The writer imported about 500 roots in 1872. They produced very slender shoots, and died out in a year or two.

A. Natalensis, Hort.

This pretty plant was received from Trinidad in 1875, and did well.

Allium Cepa, Linn. Onion.

One of the staple products of Bermuda, for which soil and climate seem alike adapted. They were planted by the first settlers in 1616, and at that time probably perpetuated by seed allowed to ripen for the

purpose. At present the seed is imported annually, chiefly from Madeira. Cultivation of the plant on a large scale only dates from about 1845. Seeds of all the best varieties cultivated in Europe were sent from the Royal Gardens, Kew, in 1873, and widely distributed; 16 sorts were tried at Mount Langton. The writer could never ascertain that any of them commended themselves to the growers as superior to the sorts they were accustomed to sow.

Onions in Bermuda are sown in October and November, set out in November or December, and pulled for market in April and May. The export reached the large quantity (for the area of the islands) of 4,180 tons in 1875, which has not since been exceeded.

Aloe vulgaris, Lam.

Locally called, from its flower stalk, bamboo; very common; probably native.

A. soccotrina, Lam. Barbadoes or bitter aloe.

Naturalized and common.

Agave Americana, Linn. Golden aloe.

Not common, but found in many gardens in Paget and Warwick Parishes.

A. Mexicana, Lam. Blue aloe.

At Spanish Point; not common.

A. variegata, Hort.

Common in gardens.

A. striata, Zucc.

Introduced from Kew, 1872.

A. xylonacantha, Salm.

Introduced from Kew, 1872.

A. Jaquiniana, Sch.

Introduced from Cambridge, Mass., 1874.

Yucca serrulata, Haw. Spanish bayonet.

Very common; its tall white spikes of flowers are highly ornamental in May and June (*Y. aloifolia*, Linn., in Dr. Rein's list). *Y. filamentosa*, Linn., and *Y. Whipplei*, Torrey, were among plants received from the Botanical Gardens, Cambridge, Mass., in 1874, which survived and were established at Mount Langton.

Gasterica obliqua, Haw., *G. maculata* Haw., and *Haworthia tortuosa*, Haw., were introduced at Mount Langton from England and are likely to become common in gardens.

Euclearis Amazonica, Lindl.

Imported from the West Indies, 1876, and flowered well.

Lilium candidum, Linn.

Tall white lily; very common in gardens.

L. Japonicum, Thuub.

White Japan lily; also common. Both are largely used as Easter decorations.

Ischarum Boveii? Hook, (Blume, Rumph, i, 29), *loc.* Black lily.

Brought from the neighborhood of Hebron by Mr. and Mrs. T. S. Reid in 1876. The roots, two in number, have thrice flowered in Bermuda towards the end of March. The spadix is described as of a charcoal black, the interior of the spathe resembling a dark, rich, velvet toning to maroon. (R. Gaz.; 25 March, 1879.)

Narcissus Jonquilla, Linn. Jonquil.

Naturalized and common.

Hyacinthus orientalis. Hyacinth.

Was grown at Mount Langton, but not well.

Ornithogalum latifolium, Linn. Star of Bethlehem, *loc.* Squill.

Naturalized, and met with about old houses.

Cyrtanthus catalpaefolia, Nees.

From Cambridge, Mass., 1874. It flowers well.

Medeola Virginica, Linn.

A small annual weed found under walls. (*M. Carolinea* in Lane's list.)

Eucomis regia, Ait.

Received from Cambridge, Mass., 1874.

Hemerocallis fulva, Linn., W. Day lily.

In gardens.

Gladiolus, sp.

Many varieties are found in gardens. A considerable number of bulbs received direct from the Cape of Good Hope, in 1874, were planted with indifferent success; the flowers were poor; the plants died out.

Sansevieria Guineensis, Willd. Bowstring hemp.

Naturalized, and common in gardens.

Phormium tenax, Forst. New Zealand flax.

Introduced from Kew in 1875, and planted in Pembroke marsh, where, however, it did not flourish, although the plants were living in 1877. They were choked by native weeds.

Polianthes tuberosa, Linn. Tuberose.

To be met with in gardens. Originally a native of India.

Scilla sp.? Squill.

A species is naturalized, and springs up spontaneously about old houses.

Fourcroya gigantea, Vent. Aloe.

Naturalized and common.

Pancratium ovatum, Mill. Spider lily; Churchyard lily.

Naturalized, and common in gardens.

Orinum cruentum, Ker. Giant lily, or Essequibo lily.

Naturalized, and common in gardens.

Amaryllis cquestris, Ait. Barbadoes lily.

Naturalized, and common about houses.

A. Sarniensis, Linn. Guernsey lily. (*Nerine sarniensis*, ~~Herb.~~)

Nerine pulchella, Herb.

Leucoium æstivum Linn. Snowflake.

In the garden at Cavendish; flowers regularly.

Zephyranthes Atamasco, Herb.

Z. rosea, Lindl.

Grown at Mount Langton.

XIV.—SMILACEÆ.

Smilax sagittæfolia, Bot. Mag. Sarsaparilla.

Naturalized at Camden and abundant there, but not often found elsewhere.

Cordyline angustifolia, Hort.

From Cambridge, Mass., 1874; doing well 1877.

Dracæna terminalis, Linn. Purple dracæna.

D. australis, Forst. Green dracæna.

Common in gardens.

XV.—JUNCÆÆ.

Juncus tenuis, Willd. Rush.

Common in moist places.

J. maritimus, Lane. Large marsh rush.

Native; common in the wetter portions of the marshes.

XVI.—COMMELYNEÆ.

Tradescantia discolor, Herit. Spider-root. Oyster-plant.

Common in gardens.

Tinantia Sprucei, C. B. Clarke.

This plant appeared as a seedling in some partly West India soil at Mount Langton=*Tradescantia erecta*, Jacq.

Commelyna agraria, Kth. Day-flower. (*C. Cayennensis*, Rich.)

Native; and very general in wet places, to which its bright blue flower is an ornament; sometimes called "Chicken-grass."

Cyanotis discolor, L'Herit.

Common in gardens and window-boxes.

XVII.—CYPERACEÆ.

Cyperus rotundus, Linn. Nut-grass.

Native; according to Moseley there are 10 or 12 species.

C. flexuosus, Vahl.

Native.

C. alternifolius, Linn. Variegated cyperus.

Introduced; common in gardens. The name comes from Cypris, a title of Venus.

Kyllingia monocephala, Linn. Sedge.

In Pembroke marsh.

Scirpus validus, Vahl., (*S. lacustris* id). Club-rush.

Common in Pembroke marsh.

S. plantagineus, Roxb., Sw.

In Pembroke marsh, (*Eleocharis*, R. Br.)

S. melanocarpus, Gr.

Cladium occidentale, Schradl. Prickly sedge.

In Pembroke marsh.

Rhynchospora stellata, Gr. White sedge.

Native; abundant in Pembroke marsh.

R. pura, Griseb.

R. Florida, A. Dietr.

From *rhynchos*, a snout or beak; *spora*, a seed, Gr. They are all West Indian.

XVIII.—GRAMINEÆ.

Bambusa vulgaris, Wendl. Cane; Bamboo (which latter term is also applied to the flower stalks of the aloe).

An ornament of lawns and shrubberies, and used for fencing, but not grown to any extent.

Alopecurus pratensis, Linn. Fox-tailed grass.

Arundo Donax, Linn. Cow-cane.

Found in many gardens, and cut as fodder for cattle.

Arundinaria tecta, Muhl.

S. elongatus, R. Br.

S. Virginicus, Kunth.

S. purgans. Kth.

From Dr. Rein's list. Probably *S. pungens*, Kth.

S. Indicus, R. Br.

Polypogon monspeliensis, Desf.

Found among the rocks, North shore.

Leptochloa mucronata, Kunth.

From *leptos*, slender; *choé*-grass, Gr.

Eleusine Indica, Gaertn.

Chloris petraea, Sw.

Cynodon Dactylon, Pers. Devil grass.

In the United States, Bermuda or Scotch grass.

Paspalum distichum, Burm. (*P. littorale*), R. Br.

P. filiforme, Flügge. Wire grass.

P. setaceum, Mich.

Paspalum from the Greek name for millet.

Stenotaphrum Americanum, Schrk.

S. glabrum, Trin. Crab grass.

The general herbage of the country.

Digitaria setigera, Roth. Finger grass.

Sclerochloa rigida, Panzer. Hard grass.

Probably introduced from Europe.

Panicum molle, Swartz. Para grass.

Grown in marshy grounds as cattle food, especially at Camden.

P. maximum, Jacq. Guinea grass.

P. brevifolium, Kunth.

P. capillare, Linn.

P. lineare, Burm.

P. oplismenus.

Found in the cave near Smith's Parish church.

P. variegatum.

This ornamental Australian species was introduced at Mount Langton and lived for 3 years, but never appeared very flourishing.

P. virgatum, Linn.

Gynerium argenteum, Nees. Pampas grass.

Grown at Mount Langton and Clarence Hill.

Setaria glauca, Beauv.

From *seta*, a bristle.

Cenchrus echinatus, Linn.

Common on the Paget sand hills; not, as in Jamaica, used for cattle.

C. tribuloides, Linn. ^p

Kenchros is the Greek name for millet.

Andropogon schænanthus, Linn. Lemon grass.

From *anér*, man; *pogon*, beard, Gr.

Sorghum saccharatum, Mœnch. Guinea corn.

Cultivated as food for cattle. The word is Indian.

Saccharum officinarum, Linn. Sugar cane.

Introduced as early as 1623, but never cultivated to any extent,

although it was thought necessary in 1675 to pass a law to prevent the destruction of cedar for sugar boiling. It is now grown along the margins of water courses, chiefly for sale in sticks, and, not being manured or cultivated properly, possesses but little saccharine quality.

Phalaris Canariensis, Linn. Canary grass.

Grown for cage-birds.

Zea Mays, Linn. Indian corn.

Maize has been cultivated since the earliest settlement of Bermuda. It is mentioned in laws of 1622, and is still the only cereal grown for food. The writer frequently remarked "sports" such, as a bunch of stamens on the cob, or well-formed grains at the head of the plant, on the staminate flower.

Avena sativa, Linn. Oat.

"Grows well for a time, and then dies off before ripening seed. It is generally sown in ground intended for potatoes, and ploughed or dug in." (J. M. Jones.)

Triticum vulgare, Linn. Wheat.

"Grows well in some places, and produces a fair grain. In former years it was more extensively cultivated, and bread was frequently made in farm-houses, but of late years its cultivation has ceased." (*Id.*)

Hordeum vulgare, Linn. Barley.

"Grows well and ripens, but is seldom cultivated as a crop." (*Id.*)

CRYPTOGAMIA.

I.—FILICES.

Adiantum cuneatum, Langs. et Fisch. Maiden-hair.

The only native *Adiantum*; universal on rocks where there is shade and moisture, and abundant. The species being Brazilian, not native either to the West Indies or to the United States, its establishment in Bermuda is a matter of some interest.

The following exotic *Adiantums* were cultivated at Mount Langton, and some of them planted out in promising localities about Paynter's Vale, with a view to their introduction: *Adiantum Capillus-Veneris*, Linn.; *A. caudatum*, Linn.; *A. concinnum*, H. D. K.; *A. cultratum*, J. Sen.; *A. Farleyense*, Moore.; *A. intermedium*, Swartz.; *A. macrophyllum*, Swartz.; *A. pedatum*, Linn.; *A. uniforme*, Linn.; *A. tenerum*, Swartz.; *A. trapeziforme*, Linn. *Adiantum pedatum*, Linn., which is a species of northern latitudes, barely lived in the fernery.

Pteris heterophylla, Linn.

Luxuriant and abundant at the Church Cave, but not often found elsewhere, and confined, as far as the writer's observation goes, to the Walsingham tract. It is a Brazilian and Central American species, but occurs in the West Indies also.

P. aquilina, Linn. Bracken.

General over the islands; especially abundant in Pembroke marsh. Perhaps the most universal of all ferns.

In addition to the above, *Pteris longifolia*, Linn.; *P. quadri-aurita*, Retz, and *P. serrulata*, Linnf., were cultivated at Mount Langton, and the first and last set out in suitable localities.

Acrostichum aureum, Linn. Marsh fern.

Abundant in brackish marshes, where it attains a great size. A fern of wide diffusion, found both in Florida and the West Indies. (*Chrysodium vulgare*, Fée.)

Woodwardia Virginica, Smith.

Found only in Pembroke marsh, and not very abundant. The young plants have a general resemblance to *Osmunda cinnamomea*, Linn., but may be distinguished at any stage by the loops in the veins parallel to the midrib of the *pinnae*, which are radial in *Osmunda*. It is an American and not West Indian species.

Asplenium crenulatum, Fries.

Found chiefly in the Walsingham tract, and not very common. (*A. serratum*, Lindl.) A species of the West Indies and Central America.

A. Trichomanes, Linn.

Generally diffused; common to all northern, temperate, and tropical regions.

A. dentatum, Linn.

This pretty little fern is generally found at the mouths of caves, both in the Walsingham tract and elsewhere. It fills a cave on Grace's Island. It is a native of Florida and the West Indies.

A. myriophyllum, Presl. (*A. cicutarium*, Swartz, Sieb., Mart., 360, Hook., Metten.; *A. rhizophyllum*, Kunze, Hook.)

The rarest of Bermuda ferns; only found about the Church Cave. It is certainly not what is usually labeled *A. cicutarium* in collections. It is native to the West Indies and Southern United States. *Rhizo-*

phyllum seems misleading; it was labeled *Myriophyllum* at Cambridge, Mass., which describes it very well.

The following were also cultivated at Mount Langton: *Asplenium auritum*, Swartz; *A. cicutarium*, Swartz; *A. Fabianum*, Homb.; *A. firmum*, Fée; *A. Nidus*; *A. viviparum*, Presl.

Aspidium Capense, Willd. Devonshire marsh fern.

This beautiful fern is confined to a few spots of Devonshire marsh, and is in danger of extermination, not being abundant. The writer transferred some plants to Pembroke marsh, but they were not established. It requires much shade and moisture. Habitat, America from Cuba to Patagonia, South Africa, and Polynesia.

Nephrodium amplum, Baker.

Common by roadsides. A Central American and West Indian species.

N. patens, Desm.

Very common by roadsides; a fern which does not require moisture. Native of Florida, Texas, and Central America; not West Indian.

N. tetragonum, Hk.

Confined to the Walsingham tract, and not common. It belongs to Central America, and occurs neither in Florida nor the West Indies.

N. villosum, Presl.

Pretty abundant; one of the ferns found in dry places. It is native of the West Indies and Central America.

N. Thelypteris, Desv.

Found along the north side of Pembroke marsh, and not elsewhere; it dies down in winter. It is generally diffused in northern latitudes. *Nephrodium molle*, Desm., from the West Indies, was planted out in suitable places.

Nephrolepis exaltata, Schott.

Common among the rocks of Walsingham and elsewhere. The species belongs both to the United States and the West Indies.

Polypodium elasticum, Rich.

Found chiefly in the Walsingham tract, and not very common. (*P. cultratum*, Willd.) A native of Cuba and Central America.

Osmunda regalis, Linn.

Grows in abundance in Pembroke marsh; not found in the West Indies, but otherwise a fern of very wide range.

Osmunda cinnamomea, Linn.

Abundant also in Pembroke marsh. Native of the United States and the West Indies.

Blechnum occidentale, Linn.

Was planted out in suitable places in 1877.

Besides the ferns which have been enumerated above, the writer introduced and cultivated the following species, nearly all of which are readily grown with a little protection. The temperature of the air in the fernery by self-registering thermometers ranged from 48° to 87° in the year: *Anemia adiantifolia*, Sw.; *Cheilanthes microphylla*, Swartz; *Cystopteris bulbifera*, Bernh.; *C. fragilis*, Bernh.; *Davallia aculeata*, Swartz; *D. Canariensis*, Smith; *Dicksonia punctilobula*, Hook.; *Gymnogramme calomelanos*, Kaulf.; *G. sulfurea*, Desv.; *G. tartarea*, Desv.; *G. tomentosa*, Desv.; *Hemionitis palmata*, Linn.; *Lomaria gibba*, Labill.; *Onoclea sensibilis*, Linn. (which, however, did not flourish); *Pellaea Breweri*, Eaton; *P. hastata*, Link; *P. rotundifolia*, Hook.; *Polypodium aureum*, Linn.; *P. vulgare*, Linn. (brought from Ireland); *P. divergens*, Hook.; *P. Dryopteris*, Linn. (which did not flourish); *P. marginellum*, Sw.; *Scolopendrium vulgare*, Sm. (brought from Ireland); *Trichomanes crispum*, Linn. (which could not long be kept alive). This enumeration may have some interest for future horticulturists in Bermuda.

II.—EQUISETACEÆ.

Equisetum palustre, Linn.? Jointed marsh-weed.

Pembroke marsh. Common in West Indies and United States.

III.—LYCOPODIACEÆ.

Psilotum triquetrum, Sw.

Rare, but found about some of the caves in the Walsingham tract.

Selaginella Martensii, Spreng.

Found in gardens.

The following were also introduced from Kew: *S. Griffithsii*, Spreng.; *S. furcata*, Har.; *S. hamatodes*, *S. inequifolium*, *S. Martensii*, var. and *stolonifera*, Swartz; *S. viticulosa*, *S. Wallichii*; all of which grew well in a fernery.

IV.—CHARACEÆ.

Chara foetida, A. Br.

This plant is abundant in wet ditches at Mount Langton.

V.—HEPATICÆ.

Jungermannia, sp.

Sphagnum palustre. Bog moss.

VI.—FUNGI.

The common mushroom, *Agaricum campestris*, Linn., appears rarely in Bermuda. They were to be found in 1852 near Pembroke churchyard. (Mr. Hurdis, in *The Naturalist in Bermuda*, p. 176.) The writer has, however, never seen them wild. They were grown at Mount Langton in an artificial cave from spawn imported from Halifax, and at times pretty abundant. The *fungi* of Bermuda, as an order, have not received attention. .

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PART III.

THE MAMMALS OF BERMUDA.

BY

J. MATTHEW JONES, F. R. S. C.,
OF FERN LODGE, WATERVILLE, NOVA SCOTIA.

THE MAMMALS OF BERMUDA.

Paucity of species, as regards mammalian life on oceanic islands, is a fact well known to all observers; nor can the circumstance create any degree of surprise when we become cognizant of the complete isolation of such positions from any continent, their small area, and recent origin.

The Bermudas present no exception to this general rule, and therefore the present meagre list will not excite astonishment, especially when their peculiar formation and density of population are taken into account.

Order CHEIROPTERA.

Family VESPERTILIONIDÆ.

SCOTOPHILUS NOCTIVAGANS, Lec.

"Silver-haired Bat."

Only one specimen of this Bat is known to have occurred in the Bermudas. It was taken alive near Hamilton on the 8th of October, 1850.

Its geographical range on the North American continent extends, according to Allen,* from the Atlantic coast to the Rocky Mountains, and as far north as the Hudson's Bay Territory.

LASIURUS CINEREUS, Allen.

"Hoary Bat."

According to the observations of my friend, Mr. J. L. Hurdis, of Southampton, England, who passed fourteen years upon the islands in an official capacity, and during that lengthy period was a close observer of the habits of all animals which came under his notice, only two species of Bat are known to visit the Bermudas, and that usually in the autumn and early months of winter. The present species is observed occasionally at dusk during the autumn months hawking about accord-

* Monograph of the Bats of North America. By H. Allen, M. D., asst. surg. U. S. A. p. 41.

ing to its nature in search of insects; but as it is never seen except at that particular season it is clear that it is not a resident, but merely blown across the ocean by those violent northwest gales which also usually bring numbers of birds from the American continent.

The geographical range of this species appears to extend all over the continent of America north of Mexico, extending as far north as Red River Settlement in British North America.

Order CETACEA.

There are two species of Whales now frequenting the sea surrounding the Bermudas, in spring and early summer, and they are doubtless the same which visited the group in the earliest times of which we possess a record. Jourdan* has the first account of Whales being observed there in 1610.

"There are also great plentie whales which I conceive are very easie to be killed for they come so usually and ordinarilie to the shore that wee heard them oftentimes in the night abed and have seen many of them neare the shoare in the day time."

In Smith's "History of Virginia" (1616), we also find mention of Whales at the Bermudas during the months of January, February, and March.

Again, in the "Constituecons and Instructions to Mr. Daniel Tucker now chosen Deputie Gounor for the Somer Islands given by the Gouenor and Companie of the Cittye of London for the said Plantacon" (1616), allusion is made to them.

"As touchinge the whale fishinge we would have you observe that we have sent John Headland our chief harpeneere, Henry Hughes his mate, and others of his ginge (gang) to whose assistance we ioyne Mr. Wilmott as skillful in that buisness, with such others to help as you shall appointe thereto. And that you omitt noe tyme at yor first cominge thither to sett upon that worke, consideringe that the whale fishinge will be soe neare spent before you shall come thither."

It is therefore evident from the foregoing statements that one or more species of these marine mammals regularly visited the islands every spring, and we shall now endeavor to identify those species from the descriptions given by early writers, which are fortunately sufficiently expressive to permit of such determination.

* A Plain description of the Barmodas, now called Sommer Ilands, with the manner of their discouerie anno 1609. By Sylvanus Jourdan. London, 1613.

Family BALÆNIDÆ.

EUBALÆNA CISARCTICA, and others.

Common Whale. Right Whale. Cape Whale. Hump-back, &c. .

The Right Whale is the only species which may be called a regular migrant to the shores of the Bermudas, and its occurrence there opens up a very interesting source of inquiry as to whether the individuals annually visiting the islands really come from the north and return thither, or merely pass their existence in mid-Atlantic, and resort for some reason to the group with their young during the months of February, March, April, May, and June.

Now, first as to the identification of this species with that so often mentioned by early writers. In the Philosophical Transactions (Royal Society of London) for 1668 appears a communication from Richard Norwood, who was the first person to survey the islands and divide them into shares. It is dated—

“BERMUDA, June 18, 1667.

“The killing of whales, it hath been formerly attempted in vain, but within these two or three years, in the spring time and fair weather, they take sometimes one, two, or three in a day. They are less, I hear, than those in Greenland, but more quick and lively; so that if they be struck in deep water they presently make into the deep with such violence that the boat is in danger of being haled down after them if they cut not the rope in time. Therefore they usually strike them in shoal water. They have very good boats for that purpose, manned with six oars, such as they can row forwards or backwards as occasion requir-eth. They row up gently to the whale, and so he will scarcely shun them, and when the harpioneer, standing ready fitted, sees his opportunity, he strikes his harping-iron into the whale about or before the fins rather than towards the taylor. Now, the harping-irons are like those which are usual in England in striking porpoises, but singular good metal, that will not break, but bend, as they say, about a man's hand. To the harping-iron is made fast a strong lythe rope, and into the socket of that iron is put a staff, which, when the whale is struck, comes out of the socket, and so when the whale is something quiet they hale up to him by the rope, and, it may be, strike into him another harping-iron, or lance him with lances in staves till they have killed

him. This I write by relation, for I have not seen any killed myself."

The fact of their capturing the whale in shoal water proclaims it to belong to this species, for the sperm whale, which is the only other cetæcean known to visit the Bermudas, is never known to come near shore.

Another communication to the same society from one Richard Stafford, dated at Bermuda, July 16, 1635, also proclaims the identity of this species:

"We have hereabouts very many sorts of fishes. There is amongst them great store of whales, which in March, April, and May, use our coast. I have myself killed many of them. Their females have abundance of milk, which the young ones suck out of the teats that grow by their navel. They have no teeth, but feed on moss growing on the rocks at the bottom during these three months, and at no other season of the year. When it is consumed and gone, the whales go away also. These we kill for their oil."

The Right Whale fishing around the Bermudas appears to have been prosecuted by the islanders with more or less success from these early times until the present, when, owing probably to the more profitable and pleasant pursuit of agriculture, which combines at the same time a security of person quite foreign to that of the whale fisher, as the numerous accidents on record prove, it is not followed with the same ardor which characterized the efforts of the early settlers. Nevertheless we find that almost every year some of these whales are taken; and one season they were so numerous that no less than twenty were taken off the east end of the islands. Cub whales are more commonly taken than adults. These are of all sizes, as announcements in the island papers such as the following, prove:

"A fine whale of the hump-back species, a maiden cub of last year, was captured on Friday morning last (April 22, 1866), by the boats belonging to Mr. Masters' establishment at Port Royal. It was 33 feet long, exceedingly fat, and it is supposed will produce 40 barrels of oil. It was first harpooned, and then shot at three several times with bomb-lances, and though hit each time the third bomb only exploded and caused the almost instant death of the leviathan. This is the first whale that has been captured here for some years." Again: "A cub whale about 22 feet long was captured by the boats of Port Royal on Wednesday last (April 26, 1871). The old whale followed the young one and struck the boat with its tail. It was harpooned but broke the

warp; it bled freely. It came to the shore the next day, but was not captured. The cub will yield about $5\frac{1}{2}$ barrels of oil."

The adult whales, when struck near shore, often lead their captors a long chase—sometimes as much as 7 or 8 miles out to sea—and even then the warp has to be cut to save the boat. But when taken they amply recompense their lucky captors for their trouble, yielding in some cases from 60 to 70 barrels of oil. When these large whales are towed to shore the vast quantity of blood escaping from their wounds attracts numbers of sharks, some of very large size, which mutilate the body and devour much of the meat. This well-known habit of the sharks is sometimes turned to profitable account by the colored boatmen, who take what is left of the body of a whale, after the process of "flinching" has been gone through, outside the reefs, and let it remain as a bait. Several boats will join in one of these expeditions, having experienced spearmen on board, who, at every opportunity, spear a large shark which, in its turn, is converted into oil which is of particular commercial value.

There are some curious habits indulged in by this species of whale, known to the islanders, but perhaps none can be accounted so singular and remarkable as that of the animal leaping completely out of water to the height of several feet. A naval officer has placed on record an instance of this extraordinary circumstance as follows: "While we were lying on our oars, in a cutter belonging to the *Leander*, frigate, in Murray's Anchorage, off Saint George's Island, during the winter of 1802-3, we beheld one of the most extraordinary sights in the world. A whale which had by some means got inside the reef, and was endeavoring to extricate itself from its uncomfortable position, and perhaps provoked at not being able to disentangle itself from the sharp coral reefs, or for some other reason, suddenly made a spring out of the sea. So complete was this enormous leap, that for an instant he was seen fairly up in the air, in a horizontal position, at a distance from the surface, not much short I should think of half his own breadth. His back, therefore, must have been at least twenty feet in perpendicular height over our heads. While in its progress upwards, there really appeared in its spring some touch of the vivacity which belongs to a trout or salmon shooting out of the water. The whale, however, fell back again on the sea, with all the clumsiness imaginable, like a huge log thrown on its broadside; and with such a thundering crash as made all hands stare in astonishment. Total demolition, indeed, must have been the fate of

our party had the whale taken his leap one minute sooner, for he would then have fallen plump on the boat. The waves caused by the splash of the monster spread over half the anchorage, nor, if the *Leander* herself had blown up, could the effect have extended much further."

Scoresby, in his interesting work on the Arctic Whale Fishery, corroborates this curious habit, so that there can be no doubt of its being an indisputable fact.

This whale appears to have been the victim of assault from the Sword-fish (*Xiphias gladius*) and Thresher (*Alopias vulpes*) in days of yore, as as we glean from the pages of an old writer on the Bermudas.*

"I forbear to speake what a sorte of whales wee have seene hard aboae the shoare followed sometime by the Sword Fish and the Thresher, the sport whereof was not unpleasant. The sword-fish, with his sharpe and needle finne pricking him into the belly when he would sinke and fall into the sea; and when hee startled vpward from his wounds, the Thresher with his large Fins (like Flayles) beating him aboue water. The example whereof giues vs (saith Ouiedus) to vnderstand, that in the selfe same perile and danger doe men liue in this mortall life, wherein is no certaine security neither in high estate nor low."

And this account is borne out by a further statement to the same effect, made by another eye-witness about the same date.

"Whales there are in great store at that time of the yeare when they come in, which time of their comming is in Februarie and tarry till June. Likewise there commeth in two other fishes with them, but such as the whale had rather bee without there companie; one is called a Sword-fish, the other a Threasher; the sword-fish swimmes vnder the whale and pricketh him vpward; the Threasher keepeth aboue him, and with a mightye great thing like vnto a flayle hee so bangeth the whale, that he will roare as though it thundered, and doth giue him such blowes with his weapon that you would thinke it to be a cracke of great shot."

The Right Whale will sometime become playful with its young, tossing it out of water time after time, and it is a somewhat curious fact that they are more prone to indulge in this pastime during bright moonlight nights, coming close in near the edge of the reefs on the south side of the island and exhibiting their exploits within full view of persons on shore.

* "Purchas His Pilgrimes," vol. iv, London, 1625. The ninth book, chap. vi: "A true repertory of the wracke, and redemption of Sir Thomas Gates, Knight; vpon, and from the Islands of the Bermudas: his comming to Virginia, and the estate of that Colonie then. and after, vnder the gouernment of the Lord LA WARRE, July 15, 1610. Written by WILLIAM STRACHY, Esquire."

Some of the larger whales when captured are found to be infested externally by parasites, among others the well-known cirripede (*Balanus*), which, from the large size some of the specimens attain, must have been *in situ* for a considerable period.

The flesh of this whale, especially that of the cub, is often sold for food, and is considered a treat by the families of the fishermen and laborers, who cannot afford to pay the exorbitant prices demanded by the vendors of butchers' meat and poultry. We cannot, however, coincide with the statements of those who declare it impossible to tell a whale-steak from a beef one, when properly cooked, for the oily nature of the substance cannot wholly be obliterated under any circumstances, and never fails to afford the palate of the most ordinary taster a clew to its origin.

The migrations of this whale,* as far as the North Atlantic is concerned, are by no means clearly ascertained, as evinced by the statement made by M. F. Maury, who affirms that "the Right Whale does not cross the equator or reach so low a latitude as Bermuda in the West Atlantic, although it does so on the side of Madeira." A very general belief prevails that the heated waters of the Gulf Stream present an impassable barrier to the southward progress of the Right Whale, and it is somewhat strange that although the presence of this species has been known to the inhabitants of the Bermudas ever since the islands were first colonized, as well as to American whalers for many years, its mode of reaching that position has not been properly investigated. The fact of its crossing the Gulf Stream on its southward migration, and also on its return to the north, has been well known to all traders between northern parts and the West Indies ever since commercial intercourse has been established; but we are unaware of any published statements having appeared to such effect until Col. Drummond Hay, President of the Natural History Society of Perthshire, (Scotland), who was quartered with his regiment, the Forty-second Highlanders, for some years upon the islands, and devoted much of his leisure time in investigating their natural history, in a paper on "Migration," which he recently read before his society, thus alluded to the matter: "One especial instance which I will take is that of the Greenland Whale

* Owing to the confusion in local nomenclature so prevalent in Bermuda, the writer has failed to discriminate between the Right Whales and Hump-backs and the Bowhead, which never ranges so far south.—EDITOR.

(*B. mysticetus*), which, with the same regularity as the swallow, comes to Britain, visits the warm seas of the Bermuda Islands, where I have noticed them in large numbers, arriving regularly about the last week of February or beginning of March, and remaining till the beginning of June, and sometimes a little later; those frequenting the shallow waters being the cow-whales with their young, the bulls probably keeping in the deeper waters outside the reefs. While sailing from Bermuda to Nova Scotia, in the month of June, I observed large troops of the blow or true whale, all heading to the north, no doubt on their way from the Bermudas and the warmer seas."

It being, therefore, beyond doubt that the Right Whale does pass through the Gulf Stream on its southern migration to the Bermudas, it becomes an interesting question whether the animal is submitted to a higher degree of temperature while passing through the stream than it is while inhabiting the waters of Bermuda, in which it passes some four months of its existence regularly every year. We are fortunately able to give reliable information upon this subject, having during several voyages between Halifax and the Bermudas (which route, being almost direct north and south, is that traversed by the whales), at different seasons of the year, had excellent opportunities, through the kindness of the commanders of the royal mail steam packets, who are in the habit of taking observations every four hours, of ascertaining the temperature of the Gulf Stream at various positions, and we find that scarcely any difference exists in its temperature as far as regards the months of February and June, the known periods of migration, and that the highest degree of heat of the stream at those periods yet recorded has never exceeded 73°. We have next to look at the temperature of the sea immediately around the Bermudas during the months of February and March, when the whales arrive, and we find that it is generally about 64°, and that of June, when they depart, about 74°; so that it is clear these animals are submitted to a higher degree of temperature for a month or more in the locality they have chosen for a winter resort, than they are during their passage through that supposed impassable barrier of heat, the Gulf Stream. Indeed, it may be said that this whale is capable of bearing a much higher degree of temperature, for in some seasons the maximum of surface temperature at Bermuda during the month of June has reached 78°, so that all statements hitherto made to the effect that the Right or Greenland Whale is unfitted to resist the presence of heat must be considered as wholly incorrect.

It is more than probable that this whale rarely proceeds farther south in the West Atlantic than the latitude of the Bermudas, and that it possibly visits those islands merely for the purpose of bringing forth its young; a theory not unsupported by fact, when we find that the majority of whales taken consist of females and cubs.

Family PHYSETERIDÆ.

PHYSETER MACROCEPHALUS, L.

Sperm Whale; Spermaceti Whale; Trompe Whale.

This species can hardly be considered as more than a casual visitant to Bermudian waters, for it is only at intervals of a few years that the islanders have the good fortune to capture one.

The first authentic account we have of this species being found at the Bermudas is in the "Constitucons and Instructions to Mr. Daniel Tucker now chosen Deputie Gounor for the Somer Islands given by the Gouenor and Companie of the Cittye of London for the said Plantacon" (Date 1616).

"Theise kind of whales we understand by their description we have seen them are called Trompe Whales, at whose places of resort there is ever found greate store of Ambergreece, the oyle will be as hard as talowe, when yt is made, but yet very good for many uses, lett yt be carefully casked up by ytself, without any other whale oyle of other kinds to be mixed with it. Also that kind of whale yieldeth great store of Spermacety weh lyeth in the head, lett that also be carefully reserved by ytself, and put into Caske marked for Spermaceti whither yt be thin or thicke, we will trye it and refine yt when yt shall come hither and doe well observe that puttinge up the oyle the coopers may make the caske very tight, for leakedge by putting Bullrushes into the ioynts, for weh vse we have sent hence store by theise shippes."

"Those Trompe Whales are observed to have noe fins in their throats as some other small whales have, but they have in some of their inward pts great store of Ambergreece congealed, weh they have not as yet cast out, we pray that you have a care that when any whale is opened you would yourselfe attend or cause some other to see yt searched thoroughly, that neither by negligence or fraud we may be deprived of that hope."

Of late years very few have been taken. One in May, 1863, of the goodly length of 47 feet was captured, and again on June 19, 1869, an-

other was struck, about 14 miles to the south of David's Head, of the length of 40 feet. One boat alone attacked this whale, and after some difficulty the crew succeeded in killing it and towed it the whole way to Saint George's Whale House, a feat which occupied no less than seventeen hours. It was followed by a large number of sharks, which cut it considerably. This whale appears to dislike the shallow waters within soundings, and therefore has to be sought for almost out of sight of land. Some are captured off the islands occasionally by passing American whalers. Ambergris, the well-known product of this species, is alluded to in the very earliest accounts of the islands.

In the commission of Governor Moore, granted to him by the Bermuda Company on his entering upon his official duties in the year 1612, we find the following:

"Forasmuch as we cannot expect any greate returne of comodities by this shipp, by reason of her short staye yet we advise and pray you to be as prudent as you may, to send us some fruits of your labors to give encouragement to the adventurers, to make the more speedie and better supplie vnto you, especially of Ambergreece wch wee doubt not but you shall finde readye gathered by those three who were left by the last shipp, or ells by the industrie of suche of yo'r own companie as you shall employe to seek for yt, for whose better encouragement we are contented to allowe for everye once (Troye weight) that you shall receaue from any of them, the some of thirteene shillinges fowre pence, but yf you shall finde any man to goe about to conceale yt and appropriate yt to his owne prticular use, then you are to seaze upon yt, as you forfeite to the vndertakers, and inflict such other punishment upon the offenders as the qualitie of these offences shall deserve."

In the Laws of the Bermuda Company enacted in 1622, we find a protective clause concerning this commodity:

"There is likewise and shall be forever reserved to the Company a fifth part of all the Ambergreece that shall be found; and the rest shall be divided equally betweene the finder and the owner of the land where the same is found; save that three shillings four pence upon every ounce of the said Ambergreece shall be allowed to the Governour of the said Islands. And whosoever shall not discover to the said Governour and Sheriffe and some one other of the Councill, the true quantity of the Ambergreece so found, within five days after the finding of the same, shall forfeit his owne intire part to the Company, and be subject to such other punishment as the Generall Court shall award."

Again in "Domestic Correspondence," Jac. I, vol. lxxiv, No. 89, allusion is made to it in a communication from one John Chamberlain to the Right Hon. Sir Dudley Carleton, Kt:

"Oct. 27, 1613.

"From the Bermudas or Sommer-ylands there hath come great store of Ambergreece this yeare, w^{ch} is the only commoditie they have thence as yet, but they hope for more hereafter of many kindes, though nothing so rich, and begin to nestle and plant there very handsomely, where-at the Spaniard is nothing pleased but threatens the next yeare to remove them, which advertisement they have by goode meanes and many wayes, but they seeme nothing dismayed therewith, trusting rather to the difficultie of accesse, than to any other strength of theyre owne; the greatest peece of amber in one lump that hath bin heard of was found there this yeare being as bigge as the body of a giant, and annswerable or resembling almost in all points sauing for the want of the heade and one arme; but they handled the matter so foolishly that they brake yt in peeces, and the biggest they brought home was not above 168 ounces w^{ch} sells better by twelve or fifteen shillings in an ounce than that w^{ch} is smaller."

That it was considered at that time to be of particular commercial value we glean from the following threatened punishment to be inflicted on those who dared to buy or sell it on the islands (Date, 1616):

"No Marryner Sayler or any else of what quality or grade so eue^r belonging to any shippe or shipps nowe here resident or who hereafter shall arrive, may bargayne buy trucke or trade with any member of this Plantacon, man woman or childe for Ambergreece of what quantity so eue^r, nor for any Ambergreece shall exchange any their provisions whether Butter Cheese Bisket Meale Aquavitoe Oyle any kind of frute or spice or any other prouisions of what qualitie so eue^r at any tyme or soe long as they shall here remayne from the date of their presents upon payne to lose the Ambergreece soe bought or trucked for, and losse of their wages in England with corporale punishm^{te} here to be inflicted upon them, and what so eue^r pson or psons belonging unto any such shipp or shipps receeve or take any the said Ambergreece of or from any pson or psons members of this plantacon privately take the same unto England upon the same p. ill. Nor shall any pson or psons whatsoeu^r of what degree or qualitie soeu^r of their Island dare to sell any Ambergreece or the same to trucke exchange or give awaye vnto any such for money or such aforesaide prouisions or otherwise to be as aforesaide upon p.ill

to lye in Irons 48 hours wth addicon of such other severe punishm^{te} as shalbe inflicted upon them. And what soe^r pson or psons that shall at any tyme fynde any Ambergreece and not within the space of tenne dayes bringe or sende the same to the Gouverno^r or give notice thereof vnto him where he or thay shall receive content after the rate of the moitie of the halfe the Ambergreece eu^{ry} ounce shall not only lose the profit for finding thereof But also undergoe the aforesaid punishment with severity of Justice w^{ch} in that case shall surely be executed."

The weight of the several pieces of ambergris found at different times since the islands were settled appears to have varied greatly. In 1611 one is recorded of the enormous bulk of 80 pounds; in 1620, one of eight ounces; in 1625, one of nine ounces; in 1626, one of 2 ounces, and another the same year of 19½ ounces. Of late years it appears to have been rarely found.

Order INSECTIVORA.

Family SORICIDÆ.

SOREX ———?

During one of our first visits to the islands several years ago we captured what we believed to be a member of this family, but the specimen was unfortunately lost. During our last visit, in the winter of 1876-77, we gave chase to what we were almost positive was a specimen, running on the side of a by-road in Devonshire parish, but it proved too nimble and escaped. The peculiar dark velvety look of the fur and the small size of the animal was quite sufficient to distinguish it from a common mouse. We have, moreover, received the testimony of reliable persons as to a mouse of this description being occasionally caught, so we think it admissible to register the unknown under its generic name.

Order RODENTIA.

Family MURIDÆ.

MUS DECUMANUS, Pallas.

"Norway Rat"; "Brown Rat."

Mus decumanus, Pallas, Glires, 1778, 91.—Schreber, Säugt. IV, 645; tab. clxxviii.—Keyserling und Blasius, Eur. Wirb. I, 1842, 36.—De Kay, N. Y. Zool. I, 1842, 80.—Wagner, Suppl. Schreb. III, 1843, i.—Burmeister, Thiere Brasiliens, I, 1854, 152.—Aud. and Bach, N. Am. Quad. II, 1851, 22, pl. liv.

Mus norvegicus, Erxleben, Syst. An. I, 1776, 381.

The introduction of rats upon an oceanic island at a period anterior to its occupation by man can only be due to the arrival, or destruction,

of a vessel containing such animals upon its shores; and in the case of the Bermudas, which are known to have been the last resting place of many a craft long before they came into the possession of the English, there can be no doubt as to the means by which they obtained a footing upon those isles, so far distant from the nearest land.

As the Norway Rat, which it appears belonged originally to the warmer regions of Central Asia, was introduced into the western countries of Europe so late as the middle of the eighteenth century,* it clearly could not have been the species that overrun the Bermudas, according to Smith, more than a century before.† Most probably it came to the islands in some of the vessels sent out by the Bermuda Company from England laden with stores for the colonists, about the end of the eighteenth century.

In some of the older houses, especially near the sea, this rat is very troublesome, consuming almost every article it can find, even to the bedclothes of the occupants as they lie asleep, and instances are recorded where children have been seriously bitten during repose at night. This rat is also common in the marshes, where it swims and dives with facility. The old and full-grown specimens are called "beagles" by the islanders.

MUS RATTUS, L.

"Black Rat."

Mus rattus, Lin. Syst. Nat. I, 1766.—De Kay, N. Y. Zool. I, 1842, 79.—Aud. and Bach.

N. Amer. Quad. I, 1849, 189, pl. xxiii.—Giebel, Säugth. 1855, 555.

Mus americanus, De Kay, N. Y. Zool. I, 1842, 81, pl. xxi, f. 2.

Mus nigricans, Raf. Am. Month. Mag. III, 1818, 446.

This species, which was once so abundant all over Europe and North America, and probably equally so before the introduction of the common house-rat into the Bermudas, is now so scarce that it may be almost said to be extinct.

MUS TECTORUM, Savi.

"Tree Rat."

Mus tectorum, Savi. "Nuovi Giornale di Lett. 1825."—Bonaparte, Fauna Italica, plate.—Keys & Blasius, Europ. Wirb. 1842, 36.—Wagner, Suppl. Schreb. III, 1843, 405.—Burmeister, Thiere Brasiliens, I, 1854, 154.—Giebel, Zoologie, 1855, 555.

Mus alexandrinus, "Geoffr. Desc. de l'Egypte."

Mus flaviventris, "Licht. Brants Minzen, 108."

* Baird, Mammals of North America, p. 439.

† Smith, History of Virginia, p. 137.

Mus infuscatus, "Wagner, Suppl. Schreb. III, 1843, 445."

Mus setosus, "Lund, Bras. Dyr."

? *Mus rattus*, var. Aud. & Bach. N. Amer. Quad. I, 1849, 191, 194, pl. xxiii.

Mus americanus, "Lebr., Thes. II, 30; tab. xxix."—Erschleben, Syst. An. I, 1776, 385.—

Leconte, Pr. A. N. Sc. Phil. VI, 1853, 414.

Rat d'Amerique, "Brisson, Reg. An. I, 172."

The earliest account of this rat, as inhabiting the Bermudas, is about the year 1615 when, from the following instructions sent out by the Bermuda Company in London to Governor Tucker, we infer that it existed there:

"Wee have sent you yellow ratsbane in fyne powder to kill ratts to be mixed with oatemeale and laid in shells on the ground wesoever they haunt, wch lett not be neglected nor any other meanes to traps snares and whatsoever ellse. to sestroye them utterlye yf yt be possible least they mutliplie upon you and devour all yor fruits and plants."

In Capt. John Smith's History of Virginia it is stated that in the year 1618 a vessel laden with grain was wrecked on the reefs, and that numbers of rats escaped from her and landed on the islands to the great detriment of the plantation. The account is as follows:

"But the great God of heaven being angry, caused such an increase of silly rats in the space of two years so to abound, before they regarded them, that they filled not onely those places where they first were landed, but swimming from place to place, spread themselves into all parts of the countrey, insomuch that there was no iland but it was pestered with them; and some fishes have been taken with rats in their bellies, which they caught in swimming from ile to ile; their nests had almost in every tree, and in most places their burrowes in the ground like conies; they spared not the fruits of the plants, or trees, nor the very plants themselves, but ate them up. When they had set their corne, the rats would come by troupes in the night and scratch it out of the ground. If by diligent watch any escaped till it came to earing, it should then very hardly escape them; and they became noysome even to the very persons of men. They vsed all the diligence they could for the destroying of them, nourishing cats both wilde and tame, for that purpose; they vsed ratsbane, and many times set fire on the woods that oft run half a mile before it was extinct enery man was enioyned to set twelve traps, and some of their own accord have set neare an hundred, which they euer visited twice or thrice in a night; they also trained up their dogges to hunt them, wherein they became so expert that a good dog in two or three hours would kill forty or fifty. Many other devices

they used to destroy them, but could not prevail, finding them still increasing against them; nay they so devoured the fruits of the earth that they were destitute of bread for a yeare or two; so that when they had it afterwards, they were so wained from it, they easily neglected to eat it with their meat. Besides, they endeavoured so much for the planting tobacco for present gaine, that they neglected many things might more have prevailed for their good, which caused amongst them much weakness and mortality, since the beginning of this vermine.

“At last it pleased God, but by what meanes it is not well known, to take them away; in so much that the wilde cats and many dogs that lived on them were famished, and many of them leaving the woods came down to their homes, and to such places where they use to garbish their fish, and became tame. Some have attributed the destruction of them to the increase of wild cats, but that is not likely they should be so suddenly increased rather at that time, than four years before; and the chief occasion of this supposition was because they saw some companies of them leave the woods, and slew themselves for want of food; others by the coldnesse of winter which notwithstanding is neuer so great there, as with us in March, except it be in the wind; besides the rats wanted not the feathers of young birds and chickens which they daily killed, and Palmetto mosse to builde themselves warm nests out of the wind; as usually they did; neither doth it appeare that the cold was so mortal to them, seeing they would ordinarily swimme from place to place, and bee very fat even in the midst of winter. It remaineth then, that as God doth sometimes effect his will without subordinate and secondary causes, so we need not doubt, but that in the speedy increase of this vermine, as also by the preservation of so many of them by such weake meanes as they then enjoyed, and especially in the so sudden remoual of this great annoyance, there was ioyned with and besides the ordinary and manifest meanes, a more mediate and secret work of God.”

From this description it is evident that the amazing horde of rats which overran the islands at this early date were tree rats which at the present day usually construct their nests in trees, as they appear to have done two centuries and a half ago. But the question may arise, how could so vast a horde suddenly, as it were, come into being, for if we are to place any confidence in the accounts given by Jourdan not a rat was to be seen some five years previous. It certainly appears somewhat mysterious, and we cannot but think that rats existed on the islands

many years before the wreck of Sir George Somers' vessel, which is so graphically described in the work referred to. And it is, moreover, very probable that the tree or roof rat, which was an Old World species originally from Egypt and Nubia, from which it was taken to Italy and Spain,* was introduced into the Bermudas by the several wrecks of Spanish vessels which during the sixteenth century were evidently cast upon them. Many of these vessels were possibly cast away on the western reefs, as are most of the vessels voyaging from the West Indies to Europe at the present day. In this case the rats would have landed on the shores of Somerset parish, which face these reefs, and finding ample food for some years for their wants, would have had no occasion to migrate to other parts of the group. But after a lapse of a few years, taking into consideration the fecundity of the race in a genial climate, and the absence of all enemies, their numbers would increase so prodigiously that all available food would be consumed and a migration rendered absolutely necessary. Thus would occur the sudden invasion made upon the crops and stores of the early settlers who were established at the east end of the islands, for by the natural instinct granted to all animals, the position of food in plenty would soon be discovered, especially by these starving creatures.

The tree rat is very fond of fruits, and will climb up and do great damage, especially to crops of oranges. We have reason to believe that it is this species which is also so destructive to the root crop. In common with the brown rat, they will frequent stables for the purpose of procuring the oats or Indian corn given to the horses, but while the latter species generally makes its exit when surprised by holes in the floor, the former takes to the roof and escapes by the opening under the eaves. It builds its nests either in the dilapidated roofs of old houses or outhouses, or in trees. In the latter case it chooses various positions, but generally one which enables it to rest secure from the effects of the heavy gales of wind which are of frequent occurrence. We have found them as high as 20 feet from the ground, situate in an angle formed by the bole of an aged cedar and a lateral branch of the same; also within a few feet of the ground, in the fork of a branch of cedar. Again, in a low bush in a swamp, a few feet above the stagnant water. The nests which occur in the cedars are composed entirely of the bark of the same trees, called "bass" by the islanders; the long, coarse strips outside, while within, the substance gets finer and finer.

* Baird, Mammals of North America.

In other situations, as the shrub we have mentioned, the nest is composed outwardly of leaves of that shrub, with softer vegetable material within. In most cases the nest is generally spherical and about a foot in diameter. Whenever we have surprised the tenants of these nests unawares, we have always observed the young, about half or three parts grown, escape, but no old ones.

It was not until the year 1872 that we were enabled, through the kindness of Prof. S. F. Baird, satisfactorily to identify the species, as in common with the native inhabitants, we had always considered it as merely a variety of the brown rat; but in that year, having secured two half-grown young from a nest, and perceiving a marked difference in the color, especially of the under parts, we forwarded one to the Smithsonian Institution for Professor Baird's opinion, who at once recognized it as the white-bellied or roof rat of the Southern States.

MUS MUSCULUS, L.

Common Mouse.

The common mouse is very abundant throughout the islands, but more especially so where surrounding circumstances favor its support and increase. In all dwellings and their outhouses it is to be found; but usually where rats are numerous the mice are scarce; for there is no doubt that the smaller members of the tribe suffer greatly from the continued attacks of the larger ones. They are particularly numerous about planting land, and do much damage to the root crops, as well as to the Indian corn. We have observed them even in the center of the marshes where the ground was more or less covered by water, at the roots of the tall sedges, making their way over the prostrate stems. It can swim well when occasion requires, and has no doubt by this means introduced itself into many situations where its occurrence could not otherwise be satisfactorily accounted for. We have been informed that light-colored mice have been seen in different places, which the observers have supposed to differ from the common species; but our own investigations, which have extended over several years in almost every part of the group, do not allow us to concur in the supposition.

As a somewhat curious circumstance we may state that the common domestic fowl of the island will sometimes seize a mouse and eat it.

PART IV.

THE BIRDS OF BERMUDA.

BY

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THE BIRDS OF BERMUDA.

INTRODUCTION.

It was with considerable diffidence, notwithstanding the very flattering nature of the invitation sent to me, that I consented to appear a third time in print on the avi-fauna of the Bermudas, and I trust that a knowledge of this fact may go far to excuse my presumption in ranging myself among the learned professors and men of science who contribute to this work, and also the numerous short-comings in my particular department. I was puzzled for a long time how to begin my task, finally deciding to present, as a brief history of the Birds of the Bermudas, my original notes published in the "Field" newspaper in 1875, and in the "Zoologist" in 1877, thoroughly revised and brought up to date, with the addition of the synonymy and measurements of each species taken from the highest American and European authorities.

I fear a long introduction will be considered out of place in a work like this, but, as it may possibly prove of interest to any naturalist contemplating a visit to the islands, I have ventured to rewrite a large portion of my original preface, as follows :

In March, 1874, when ordered to the Bermudas to complete my tour of foreign service, I made diligent and most anxious inquiries about the birds likely to be found there, and I must say the answers I got from brother officers and others who were familiar with the islands were anything but satisfactory in an ornithological point of view. I was informed that birds were few and far between, with the exception of one or two common resident species, and a casual flock of plovers or waders in the autumn months. My ardor cooled to zero abruptly. I looked forward to the red, blue, black, and white birds of my informants, and the uncertain and erratic Plover, with a sigh of despair! Should I take a gun at all, to lie idle in the damp corrosive climate to which I was bound?

However, on board the good ship *Severn*—a hired transport, which conveyed the company of Royal Engineers, to which I then belonged, across the Atlantic—I found some officers of H. M. Fifty-third Regiment

returning to Bermuda from leave in England, one of whom (Captain Rooke) was a great sportsman, and had shot and collected some birds during his previous residence in the "beautiful isle of the sea." His account was decidedly reassuring. He spoke of twenty or more species, and delighted my ears with the magic words—"Teal" and "Snipe." I was thankful then that my trusty 16-bore was lying snug and safe in my cabin, ready to add to the Bermuda lists when called upon.

We left Gibraltar on the 12th, but did not land in Bermuda till March 30, owing to a pleasant head-wind and somewhat limited powers of locomotion. My note-book was started next day—our first on shore—and was religiously kept up from that time till June 3, 1875, when I left again for English soil.

Situated in latitude $32^{\circ} 15'$ north, and longitude $64^{\circ} 51'$ west, 600 miles or more from the great North American continent, and exposed to the full force of ever-varying gales, the long, narrow group of islands known as the "Bermudas" offer a harbor of refuge to many a weary, storm-beaten migrant on its passage north or south, and in consequence we find a great many genera of the North American avi-fauna represented in the visiting list. On this subject my friend, Mr. J. Matthew Jones, of the Middle Temple, editor of "The Naturalist in Bermuda" (1859), remarks: "That the Bermudas afford an excellent position from whence to observe the annual migration of many species of the feathered tribes of America cannot be doubted. Equidistant, or nearly so, from the shores of Nova Scotia, the United States, and the West Indian archipelago, they present, as it were, a casual resting-place to many birds while traversing the broad expanse of ocean which forms the eastern limit of their great line of flight."

Some species, as the American Golden Plover, American Snipe, Sora Rail, Night Hawk, Yellowshanks, &c., seldom fail to appear every autumn, and may be set down as regular visitors, probably from the fact that their line of migration is direct from the northeastern coasts of the continent to the West Indies and tropical South America; but, as will presently be seen, the great bulk of the recorded species are irregular or accidental visitors, whose migratory journeys are less ambitious, and who are blown off the mainland by unfavorable winds. That fresh species will from time to time be added to the present list is more than probable; in fact, it is *possible* that the whole migratory avi-fauna of North America may eventually be recorded as Bermudian. When such diminutive flyers as the Ruby-throated Humming-bird, *Trochilus colu-*

bris, and the Blue Yellow-backed Warbler, *Parula americana*, can find their way across 600 miles of water in safety, where is the line to be drawn?

With the exception of a solitary example of the European Skylark, *Alauda arvensis*, and two of the European Snipe, *Gallinago media*, the whole of the birds recorded in the Bermuda list are included in that of North America, and no species has as yet been discovered peculiar to the islands. This, if we accept the theory of the comparatively recent "Æolian" formation of the group, is not to be wondered at. At one time I actually had great hopes of establishing a real 'Mudian species, as I several times observed a small brown bird, remarkably shy and mouse-like in its habits, among the dense rushes and scrub of the larger swamps, and this I could not refer to any known North American form. I had a good view of one, too, close to me, one Sunday afternoon (*of course* it was a Sunday, when I had no gun with me), and carefully took stock of the little fellow; but as I never succeeded in procuring a specimen, I must perforce leave the question undecided, in the hope that some one may be more fortunate in this respect than myself.

Rejecting doubtful occurrences, one hundred and eighty-one species are known to have occurred in the Bermudas up to June 3, 1875. Since then five more have been added, making a total of one hundred and eighty-six species entitled to a place in the list of Bermudian birds. During the fourteen months I resided there, no less than seventy-nine species were recorded, sixty-eight of these by myself personally. I was only able to obtain specimens of sixty-one of these, but that, of course, far exceeded my original expectations. The winter of 1874-'75 was not exactly a favorable one for a collector, few violent storms occurring at critical times to drive the birds to the strange and unexpected shelter in mid-ocean. I worked hard—as hard, that is to say, as my multifarious duties as an engineer officer would permit—but many things are against the study of ornithology in the Bermudas. In the first place, the peculiar elongated shape of the group of islands, and the long distances between the various swamps and "likely" places, to say nothing of the indifferent character of the roads, render it no easy task to "register" even a particular district in the course of an afternoon. The climate, too, except when the wind is from the north in winter time, is warm and damp, and much against a long struggle through the sage bush and scrubby cedars which clothe the hills, or over the rough, steel-pointed rocks of the shore. Then there is such an extent of cedar forest,

dotted here and there with patches of highly-cultivated garden, that it is hard to find birds, or, when found, to follow them up. Mosquitoes are frightfully large and ferocious in summer and autumn, especially in and around the ponds and swamps. Many a time have I lost a long-expected shot by having to brush the little torments in dozens from my nose and eyes. And as to believing a word the good-natured colored people tell you about the extraordinary birds they see, it is simply impossible.

But, in spite of these drawbacks, I enjoyed my ornithological labors vastly, and look back with pleasure not only to the successful stalk or lucky snap-shot which occasionally rewarded my exertions, but also to the numerous instructive hours I passed, field-glass in hand, in the deepest recesses of the swamps or on the open shore, watching the agile *Mniotilta varia* and the comical *Totanus solitarius*, or listening to the loud musical "chip" of *Seiurus noveboracensis*, and the harsh, grating cry of the Phaëtons.

In the following notes I have largely availed myself of those of Colonel Wedderburn (late Forty-second Highlanders) and Mr. Hurdis (formerly controller of customs in the islands), which have already been given to the public in a little work, entitled "The Naturalist in Bermuda," to which I have before alluded; also of the collection of birds formed, during the last twenty-five years, by Mr. Bartram, of Stocks Point, near St. George's. I trust I may be held excused for the constant references to these sources of information, both by the gentlemen named and by the indulgent ornithological reader. Colonel Wedderburn and Mr. Hurdis compiled their valuable notes long before my time, as may be inferred from the date of the book mentioned (1859); and since their departure no one, except my friend Mr. J. M. Jones, appears to have kept any record of the bird-life of the islands—more's the pity. With Mr. Bartram, now an elderly man, I struck up a great friendship, and I spent many an afternoon poring over his birds. He has about one hundred and twelve species, all collected and set up by himself, and a carefully kept note-book relating to their capture. His collection is the only one of any note in the islands and contains numerous unique examples of rare stragglers. An old soldier, settling at the expiration of his service on the picturesque promontory of Stocks Point, where he still resides, Mr. Bartram has added the study of natural science to that of farming; and, in addition to producing the best arrow-root in the place, he has a turn at geology, conchology, ornithology, and several

other "ologies;" writes on scientific subjects to the local papers; and smokes his pipe in his museum, monarch of all he surveys—a commendable example to the British army.

These, however, are not the only assistants, past or present, that I met with. My friend Colonel Bland, Royal Engineers, an excellent ornithologist, though he was too much engrossed with the cares of the royal engineer's office to accompany me in many of my excursions, helped me much in my identifications, which his knowledge of Canadian forms greatly aided; while Mr. J. M. Jones, besides placing his note-book at my disposal, was always ready with a suggestion or kind word of encouragement. Lieutenant Denison, Royal Engineers, my companion in many a bird-hunt in days gone by, arrived in Bermuda in January, 1875—too late, unfortunately, to take much part in my labors. On him has devolved the task of checking and auditing my accounts, of remedying numerous deficiencies, and of supplying much additional information collected during his eighteen months' residence in Bermuda.

In conclusion I may add that my friend Mr. J. L. Hurdiss has kindly sent me his valuable MS. notes on birds made during his long sojourn in the islands; that Mr. Bartram has written me most interesting and graphic letters on recent ornithological occurrences; and that our worthy editor has never for a moment relaxed his energetic co-operation with me in the work I have undertaken.

S. G. P.

DECEMBER, 1878.

ORDER PASSERES.

Sub-order OSCINES.

Family TURDIDÆ.

Sub-family TURDINÆ.

Genus TURDUS, Linn.

1. *Turdus migratorius*, Linn. American Robin; Red-breasted Thrush.

Turdus migratorius, Linn., Forst., Vieil., Wils., Bp., Nutt., Aud., and of authors generally.

Merula migratoria, Sw. & Rich.

Turdus canadensis, Briss.

Length, 9.75; wing, 5.43; tail, 4.75; tarsus, 1.75.

Hab.—Continent of North America and portions of Mexico. West Indies rarely. Accidental in Europe. (Coates.)

By no means common, but occasionally arrives singly or in small flocks, both on northward and southward migrations, especially the former. Specimens were obtained in February and March, 1850, and in March, 1855. One was sent to Mr. J. M. Jones on November 24, 1871, when several others were seen. I saw one near Hungry Bay on October 29, 1874. Mr. Bartram obtained one at Stocks Point about the same time, and Lieutenant Denison, Royal Engineers, records one shot in Devonshire Swamp on the 27th November, 1875; these last-named occurrences establishing beyond doubt the autumnal appearance of the species, which had not been recorded in former years. Like many other migrants, the Robin would seem to modify its habits considerably on finding itself in a strange country, and to become shy and retiring in disposition. The bird I saw took up its quarters in a thick mangrove swamp, and remained there, or in some tall thick cedars hard by, for several days. An intelligent colored boy in charge of cattle on an adjoining meadow, who really *does* know how to describe a bird, saw it frequently, and told me it was very wild and hard to get near. This is very unlike the Robin I have met with in Canada and the United States. It is a thousand pities that this fine bird cannot be persuaded

to stay and breed in Bermuda, and to add its music to that of the common resident species. Colonel Wedderburn mentions (Nat. in B., p. 27) that a portion of a small flock of unfortunates, which made their appearance in February, 1850, was spared, with the hope that they might be tempted to remain; but they all disappeared in a few weeks' time, not leaving a single straggler.

2. *Turdus mustelinus*, Gm. Wood Thrush.

Turdus mustelinus, Gm., Lath., Vieil., Bp., Nutt., Aud., and of modern authors.

Merula mustelina, Rich.

Turdus melodus, Wils., *Turdus densus*, Bp., *Hylocichla mustelina*, Bd.

Length, 8.10; wing, 4.25; tail, 3.05; tarsus, 1.26.

Hab.—United States, east of Missouri Plains, south to Guatemala, Cuba, Honduras, Bermuda. (B. B. and R.)

Only one appearance of this species is on record, viz, in the autumn of 1849—a season also memorable in Bermuda annals for an extraordinary invasion of Swallows and Cuckoos, which took place throughout the islands. Both Colonel Wedderburn and Mr. Hurdie obtained specimens of this Thrush, but Mr. Bartram was not so fortunate.

3. *Turdus swainsoni*, Cab. Olive-backed Thrush.

Turdus minor, Gm., Vieil., Bp.

Turdus solitarius, Wils. *Merula wilsoni*, Sw. & Pich.

Turdus olivaceus, Gir. *Merula olivacea*, Brewer.

Turdus swainsoni, Cab., and of modern authors.

Turdus minimus, Lafresnaye, Bryant, Lawr.

Length, 7; wing, 4.15; tail, 3.10; tarsus, 1.10.

Hab.—The whole of North America, excepting, perhaps, the southwestern United States, south to Central America, New Granada, Ecuador, and Cuba. Greenland, Europe and Siberia (accidental). (Coues.)

This species also visited Bermuda in small numbers during the productive autumn of 1849, when a few were obtained. It has since occurred, at long intervals, in the autumn. Mr. Bartram's collection contains three specimens of various dates. On April 20, 1875, I shot a fine male in Smith's Marsh, the first recorded instance of its vernal appearance. The stomach contained four or five white grubs, and some fragments of marsh plants. One was brought to Lieutenant Denison, Royal Engineers, on the 22d September, 1875, and another (a male) killed by a boy with a stick in Devonshire Swamp, on the 19th February, 1876.

Sub-family MIMINÆ.

Genus MIMUS, Boie.

4. *Mimus carolinensis*, (Linn.) Gray. Cat-bird.*Muscicapa carolinensis*, Linn.*Turdus carolinensis*, Licht.*Orpheus carolinensis*, Aud.*Mimus carolinensis*, Gray, Bd., and of modern authors.*Galeoscoptes carolinensis*, Cab., Bd., Sumich., Sel., Stev.*Felivox carolinensis*, Bp.*Turdus felivox*, Vieil., Bp., Nutt., Aud.*Orpheus felivox*, Sw. & Rich., Aud.*Mimus felivox*, Bp.*Turdus lividus*, Wils.

Length, 8.85; wing, 3.65; tail, 4; tarsus, 1.5.

Hab.—United States, north to Red River and Saskatchewan; west to the Columbia, to Utah, Wyoming, and Colorado; south to Panama, Mexico, Cuba. Resident in Southern States (Coues).

Locally termed "Blackbird." Resident and abundant; its harsh, mewing cry may be heard all the year round, relieved in spring by a weak but commendable roundelay. After a shower of rain in May or June the marshes appear literally alive with these sprightly birds, and a most agreeable concert takes place among the males, prolonged till dusk should the weather continue fine. On ordinary occasions during spring time they sing a good deal, but rain seems to delight them beyond measure. They are at most times remarkably bold birds, and follow an intruder through the swamp or cedar grove, perching close to him and scolding most unmusically; but when a pair have a nest they are far more suspicious, and silently leave the neighborhood of their home. The hen bird sits very close on her eggs, but when disturbed darts rapidly away, returning as quickly and noiselessly when danger is past. Nidification commences about the end of March and again at the end of May, two broods being reared. The nest is a large clumsy structure, built of dry grasses, weeds, and twigs, lined with small rootlets. It is very often ornamented externally with rags, bits of paper, skeleton leaves, &c., according to the quaint fancy of the architect. The usual site is in a cedar branch or lemon tree, at from three to eight feet from the ground; but occasionally an ambitious pair will go a few feet higher. Eggs deep blue, with a greenish tinge, .92 in. by .68 in., usually four in number. Among the numerous nests I examined I found a considerable proportion to contain one egg much shorter and rounder than

the other three. In one case this egg was almost a perfect sphere. There being but few grapes or wild fruit grown in Bermuda to attract these mischievous birds, they are not looked upon with the same disfavor as in the United States. Mr. Hurdis mentions two instances of the occurrence of this species in mottled plumage, and I was told of one being seen, while I was there, with a good deal of white about it.

Family SAXICOLIDÆ.

Genus SAXICOLA, Bechst.

5. *Saxicola œnanthe*, Bechst. Wheatear.

Motacilla œnanthe, Linn.

Saxicola œnanthe, Bechst., and authors generally.

Saxicola œnanthoides, Vig., Cass.

Length, 6; wing, 3.45; tail, 2.50; tarsus, 1.05.

Hab.—An Old World species (Europe, North Africa, and Asia). Abundant in Greenland. Found probably as an autumnal migrant in Labrador, Canada, Nova Scotia, &c. Very occasional in the Eastern States: Long Island. (B. B. & R.)

This bird, a waif and a stray from Europe, via Greenland, to the American continent, has actually found its way to these remote islands. One was shot by an officer of the garrison, near the light-house, on October 5, 1846; the tail, unfortunately, was the only portion preserved, but this was sent to the late Mr. Yarrell, who confirmed its identity. Another was seen frequently by Colonel Drummond and Colonel Wedderburn, near St. George's, in March, 1850, but baffled all their attempts to obtain it. Whether these two examples came direct from Greenland, or were blown off the American coast, is an inscrutable mystery. No others have since been recorded.

Genus SIALIA, Sw.

6. *Sialia sialis* (Linn.) Hald. Eastern Bluebird.

Motacilla sialis, Linn.

Sylvia sialis, Lath., Vieil., Wils.

Saxicola sialis, Bp.

Ampelis sialis, Nutt.

Sialia sialis, Hald. and modern authors.

Sialia wilsoni, Sw., Aud.

Erythaca (Sialia) Wiltoni, Sw. & Rich.

Length, 6.75; wing, 4.00; tail, 2.90.

Hab.—Eastern faunal area of temperate North America, north to 48°; west to Western Kansas (to Colorado, Holden) and Lower Missouri region; Bermuda, Cuba. (Coues.)

The Bluebird is one of the resident species, and is very common. It is also migratory, arriving in small flocks after heavy gales in the winter months. Colonel Wedderburn observed them in large flocks at Ireland Island on January 5, 1848; and my friend Mr. J. M. Jones records their appearance in smaller bands in the Novembers of 1866 and 1871. I have frequently noticed a sudden increase in the numbers of this species in the winter, but the visitors appear to leave again in the early spring, taking with them doubtless some of their 'Mudian brethren, for no perceptible accession of strength is apparent during the ensuing summer, and, as will presently be seen in a quotation from Mr. Hurdis' notes, so many occasionally take their departure as to cause a perceptible diminution in the numbers of the resident birds.

Mr. Bartram, an excellent authority, inclines to the belief that they do not migrate, but merely collect into flocks for the winter, but with all due deference to him I think the following account by Mr. Hurdis is sufficient to prove their migratory habits in the islands. "Although this beautiful and familiar bird appears to be a permanent resident in the Bermudas, vast flights of them sometimes arrive from the American coast. This was particularly the case as observed by Colonel Wedderburn in the winter months of 1848. In December, 1849, I fell in with a large flock of these birds in Paget Parish. There was an appearance of wildness and vigor about them which convinced me they were strangers. A small party of eight or ten birds of a different species was observed in the midst of these Bluebirds, moving with the flock from place to place. I contrived to get within range of the small party and brought down one specimen, which proved to be a Cedar Waxwing (*A. cedrorum*), in beautiful plumage, but wanting the waxen appendages to the secondaries. It was, consequently, a young bird of that year. Now the Cedar Waxwing is a rare visitant in the Bermudas and is never known to breed there. These Cedar-birds, then, must have arrived recently in these islands, and in all probability had traversed the ocean in company with the flock of Bluebirds they were associating with.

"There is reason to believe that numbers of the native Bluebirds leave the Bermudas with these large migratory flocks, thereby causing, as in the summer of 1851, a comparative scarcity of that bird; indeed, but for this supposed movement, it would be difficult to account for the annual increase of the native birds.

This is, to my mind, the most delightful of birds, and certainly the flower of the limited flock of Bermuda residents; its brilliant plumage,

vivacious manners, and pleasant warble render it an object of interest to all ; while its confiding and fearless nature in the breeding season, and the number of noxious insects it destroys, cause it to be strictly protected throughout the islands. The male bird in spring, when the sun's rays illumine his dazzling blue plumage, is perfectly lovely ; he flashes across the road like a ray of azure light, and seems actually to blaze with intense color from among the sombre foliage of the cedars. His spouse is far more sober in her attire ; but she too puts on nuptial attire and looks uncommonly smart in April and May, when she acquires an unusually vivid blue, and much suffusion of reddish brown about the head. I accidentally shot one in this plumage one afternoon, thinking it was a stranger, so much did it differ from the ordinary female. They breed twice, and, I believe, in some cases thrice ; I have seen fresh eggs on April 4, and as late as June 19. Eggs four or five, delicate pale blue, unspotted, .85 inch by .68 inch. Nest of grasses and bents, in all manner of places. I have found them commonly in holes in old quarries or road-side cuttings ; also in crevices of walls ; in rocks, even when some little distance from the shore ; in holes in trees ; on the branches of trees ; in stove and water-pipes ; in calabashes, boxes, &c., hung up for them in the verandas of houses ; in the folds of a canvas awning outside the door of one of the officers' quarters at Prospect Camp ; and in several other curious situations. The female sits close, and I have caught her on the nest. The young are strikingly spotted until their first molt. The males sing much in the early morning in spring, both stationary and on the wing, and continue their song, though with diminished ardor, till an hour or so before sunset. A warm, sunny day in winter, however, is the time to hear them in perfection, when a favorite cedar grove will resound with their combined melody, each songster perched on the very topmost twig of a tall cedar. The song is merely a short, but sweet, wild little stave, sounding to me not unlike that of the Blue Thrush (*Monticola cyaneus*), as I used to hear it from the heights, far away above my head, on the rock of Gibraltar. The call-note is a soft twitter ; but they have also a loud double note, "cher-wee," reminding one forcibly of that of an *Ægialitis*. Attempts are made frequently to bring up young birds from the nest, but they rarely succeed. A few live ones are to be seen in captivity, presumably adults captured by birdlime or in traps ; but as a cage bird it is a failure. It occasionally drives the Red Bird (*Cardinalis virginianus*) from its nest, even after eggs have been laid, and uses it as a foundation for its own.

This is somewhat extraordinary, when one considers the formidable bill of the victim; but the Blue Bird is a determined little fellow, and fortune favors the bold. A great number of "crawlers"—long scaly grubs, with no end of legs—are destroyed by these useful birds, who will sit patiently watching for them on a convenient twig, swooping down on the first comer and bearing him off in triumph. They will also dart into the air after passing insects much like a Flycatcher, returning each time to their starting-point. They are very bold in pursuit of prey when they have young to feed, but always visit their nest with extreme caution should an observer be near.

Family PARIDÆ.

Sub-family SITTINÆ.

Genus SITTA, Linn.

7. *Sitta canadensis*, Linn. Red-bellied Nuthatch.

Sitta canadensis, Linn., Gm., Lath., Bp., Nutt., Aud., Bd., and other modern authors.

Sitta varia, Wils.

"*Sitta stulta* Vieill.", (Bp.)

Length, about $4\frac{1}{2}$ inches; wing, $2\frac{2}{3}$.

Hab.—North America, at large in wooded regions, but rather northerly (to 66° or farther); south, however, to the Mexican border. (Coues.)

One specimen only has been taken in Bermuda; this is in Mr. Bart-ram's collection, and was shot by himself near his house at Stocks Point.

Family CETHIADÆ.

Sub-family CETHIINÆ.

Genus CETHIA, Linn.

8. *Certhia familiaris*, Linn. Brown Creeper.

Certhia familiaris, Linn. and of authors—Vieil., Wils., Aud., &c.

Certhia americana, Bp., Nutt., Bd., &c., and nearly all local writers of eastern United States.

Certhia mexicana, Gloger and Reich., &c. (A variety.)

Length, 5.50; wing, 2.60; tail, 2.90.

Hab.—Europe, North America at large, Mexico (var.). (Coues.)

Certhia familiaris, Brown Creeper.—A male bird of this species was shot by Bendall, an old soldier of the Fifty-third regiment, out of three or four seen in Devonshire Swamp, on November 24, 1876.

Family MOTACILLIDÆ.

Sub-family ANTHINÆ.

Genus ANTHUS, Bechst.

9. *Anthus ludovicianus*, (Gm.) Licht. American Pipit.*Alauda ludoviciana*, Gm., Lath.*Anthus ludovicianus*, Licht., Bp., Aud., Girard, and modern authors.*Alauda rubra*, Gm.*Anthus rebens*, Merr.*Alauda pennsylvanica*, Briss.*Anthus pennsylvanicus*, "Zander". (Naum.)*Alauda rufa*, Wils.*Anthus spinoletta*, Bp., Nutt., Aud.*Anthus aquaticus*, Sw. & Rich., Aud.*Anthus pipicus*, Aud., Bp.*Anthus reinhardtii*, Holböll.*Anthus hypogæus*, Bp.

Length, 6.50; wing, 3.45; tail, 2.95.

Hab.—Whole of North America; Mexico; Guatemala; Bermuda; Greenland; accidental in Europe. (Coues.)*Anthus ludovicianus*, Brown Lark; Pipit.—Colonel Wedderburn has a specimen in his possession, shot by Mr. Fozard on November 26, 1848. There are two others in Mr. Bartram's collection, shot by himself near St. George's.

Family ALAUDIDÆ.

Sub-family ALAUDINÆ.

Genus OTOCORYS, Bp.

10. *Otocorys alpestris*, Bp. Shore Lark, Horned Lark.*Alauda alpestris*, Forster., Linn., Gm., Lath., Wils., Bp., Nutt., Aud., and of earlier authors generally.*Eremophila alpestris*, Boie.*Phileremos alpestris*, Brehm., Bp., Keys. & Blas.*Otocorys alpestris*, Bp., Gray, Cab.*Alauda cornuta*, Wils., Sw. & Rich.*Eremophila cornuta*, Boie, Bd., and recent American authors.*Phileremos cornutus*, Bp.*Otocorys cornuta*, Cab.

Length, 7.75; wing, 4.50; tail, 3.25; bill above, .52. (Bd.)

Hab.—Everywhere on the prairies and desert plains of North America; Atlantic States in winter; Bermuda; Europe; Asia.*Obs.*—Var. *chrysolæma*, from southwest Territories of North America and southward to New Granada. Var. *leucolæma* resident on the dry interior plains from Iowa and Minnesota westward.

Three examples are recorded by Colonel Wedderburn: two at St. George's, October 25, 1849, and one at Spanish Point, February 27, 1850. In Mr. Bartram's collection are three specimens. I shot a fine male on the north shore, close to the old lunatic asylum, on January 29, 1875. It fell into the sea, in the middle of a huge mass of gulf weed, through which I had to swim some distance for it. Fortunately, I was not observed, or I might have found myself an inmate of the adjacent building. Lieutenant Denison, Royal Engineers, obtained two specimens, after my departure, in January, 1876.

Genus ALAUDA, Linn.

11. *Alauda arvensis*, Linn. European Skylark.

Alauda arvensis, Linn.

Alauda italica, Gm.

Alauda vulgaris, Leach.

Alauda montana, Brehm.

Alauda cantarella, Bp.

Alauda dulcivox, Hodgs.

Alauda japonica, *pekinensis*, *intermedia*, Swinhoe.

Length, 7.25; wing, 4.50.

Hab.—Europe generally; Asia; Madeira; Bermuda (accidental); Egypt and N. Africa.

Mr. Hurdis shot the only example of this well-known bird on June 12, 1850. It had no appearance of being an escaped cage bird, and I do not see why a strong gale should not have driven it even to such a distance from its ordinary line of flight. Professor Newton, in his fourth edition of Yarrell's "British Birds," alludes to this specimen in describing the geographical distribution of the species, but seems inclined to doubt its being a genuine wild bird. It is worthy of remark that this unfortunate bird was described to Mr. Hurdis by a "coloured" lad as being "less than a pigeon, and of a light-green colour about the neck"; also as making a "curious noise" in the air, and as not knowing apparently "how to get down again," finally "tumbling down like a stone." This is a fair sample of the information one may expect in Bermuda.

Family SYLVICOLIDÆ.

Subfamily SYLVICOLINÆ.

Genus MNIOTILTA, Vieill.

12. *Mniotilta varia*, (Linn.) Vieil. Black and White Creeping Warbler.*Motacilla varia*, Linn.*Certhia varia*, Vieil., Aud.*Mniotilta varia*, Vieil., Bp., Ord., Aud., and of later writers.*Sylvia varia*, Bp.*Sylvicola varia*, Rich.*Certhia maculata*, Wils.*Mniotilta borealis*, Nutt.*M. varia* var. *longirostris*, Bd.

Length, 5 inches; wing, 2.85; tail, 2.25.

Hab.—Eastern North America, north to fur countries in summer; south to Mexico, Central America, and West Indies; west to Kansas and Missouri as high as Fort Pierre (Hayden); Bermuda (Coues).

In October, 1849, one example of this neat little warbler was shot at St. George's, and two or three more seen between that town and Hamilton. One was obtained at Ireland Island on October 27, 1852. Mr. J. M. Jones shot one in Devonshire Marsh in January, 1871. I found them quite common in the autumn of 1874 and winter succeeding it, and obtained several specimens, chiefly in the tall cedars of Devonshire Swamp and around Hungry Bay. This bird was one of my especial favorites, and I used to sit for hours watching its quick and graceful motions, and its dexterity in capturing insects. Its mode of "registering" branch after branch, commencing at the bottom and ending at the outermost twigs, is very like that of the Titmice.

Mr. Bartram informs me that he shot a specimen in good plumage on the 4th May, 1878. This must have been a spring visitor on its northward journey, I imagine.

Genus PARULA, Bp.

13. *Parula americana*, (Linn.) Bp. Blue Yellow-backed Warbler.*Parus americanus*, Linn.*Motacilla americana*, Gm.*Sylvia americana*, Lath., Ord.*Sylvicola americana* Ord. Woodh.*Parula americana*, Bp., Gosse, Bd., Hayd., and late writers.*Ficedula ludoviciana*, Briss.*Motacilla ludoviciana*, Gm.*Motacilla eques*, Boddaert.*Sylvia torquata*, Vieil.*Sylvia pusilla*, Wils.*Sylvicola pusilla*, Sw.

Length, 4.75; wing, 2.34; tail, 1.90.

Hab.—Eastern North America, south to Guatemala, north to Nova Scotia, west to Missouri, Mexico, West Indies, Greenland (Coues).

This diminutive bird seems hardly fitted for a journey of 600 miles across the ocean. Nevertheless, five examples are on record, viz, one shot by Canon Tristram at Ireland Island, on April 21, 1849; one found by Mr. Hurdis in 1853, in a collection of Bermuda skins sent to him for examination; two others seen by myself, one being shot near Devonshire Swamp on October 19, 1874. My bird proved to be a male in brilliant plumage; the other, probably a female, escaped. The two were fluttering and creeping about at the extreme end of a large cedar branch, like a veritable *Parus*. Mr. Bartram shot one near his house on the 26th March, 1878.

Genus PROTONOTARIA, Bd.

14. *Protonotaria citræa*, (Bodd.) Bd. Prothonotary Warbler.

Motacilla citræa, Bodd.

Mniotilla citræa, Gray.

Protonotaria citræa, Bd. and later authors.

Helminthophaga citræa, Cab.

Motacilla protonotarius, Gm.

Sylvia protonotarius, Lath., Vieil., Wils., Bp., Nutt., Aud.

Vermivora protonotarius, Bp., Woodh., Hoy.

Helinaia protonotarius, Aud.

Helmitherus protonotarius, Bp.

Length, 5.40; wing, 2.90; tail, 2.25.

Hab.—South Atlantic and Gulf States to Maryland and Pennsylvania, and even Maine, Ohio, Illinois, Kentucky, Kansas, Missouri, Cuba, Panama (Coues).

I had the pleasure of examining and identifying a specimen of this handsome warbler, the only one yet obtained, in Mr. Bartram's collection. It was presented to him by Mr. Hyland, jr., of Saint George's, who shot it, near that town, out of a small flock of the species, in the autumn of 1874, and had just been preserved when I saw it.

Genus DENDROICA, Gray.

15. *Dendroica æstiva*, (Gm.) Bd. Blue-eyed Yellow Warbler; Summer Warbler.

Motacilla æstiva, Gm.

Sylvia æstiva, Lath., Vieil., Aud., Nutt.

Sylvicola æstiva, Sw. & Rich., Aud., Woodh., Hoy.

Dendroica æstiva, Bd., Coues and late writers.

Sylvia carolinensis, Lath.

Sylvia flava, Vieil.

Sylvia citrinella, Wils.

Sylvia childreni, Aud.

Sylvia rathbonia, Aud.

Length, 5.25; wing, 2.66; tail, 2.25.

Hab.—Whole of North America through Mexico and Central America into South America; West Indies (represented by several insular forms apparently not specifically distinct) (Coues).

Mr. Bartram has two specimens in his collection obtained by himself at different dates. Lieutenant Denison, Royal Engineers, has also two, both males, shot in Devonshire Swamp on the 23d November, 1875.

16. *Dendroica virens*, (Gm.) Bd. Black-throated Green Warbler.

Motacilla virens, Gm.

Sylvia virens, Lath., Vieil., Wils., Bp., Nutt., Aud.

Sylvicola virens, Bp., Aud., Woodh., Reinh.

Rhimanphus virens, Cab., Sc.

Mniotilta virens, Gray, Reinh.

Dendroica virens, Bd. and later writers generally.

Length, 5.00; wing, 2.58; tail, 2.30.

Hab.—Eastern United States to Missouri; south to Guatemala; accidental in Greenland and Europe.

Another novelty brought to light in examining Mr. Bartram's birds. He has three examples, one in the obscure plumage of youth, the others in the "fall" or female plumage of the adult.

A recent letter from Mr. Bartram contains the following: "On the 7th of May (1878) I shot a black-throated green Warbler showing a triangular jet-black patch under the chin and throat, length $4\frac{3}{4}$ inches, wing $2\frac{1}{2}$, tail 2."

17. *Dendroica caerulescens*, Bd. Black-throated Blue Warbler.

Motacilla caerulescens, Gm.

Sylvia caerulescens, Lath., Vieil.

Dendroica caerulescens, Bd., Mayn., Coues.

Motacilla canadensis, Linn.

Sylvia canadensis, Lath., Wils., Bp., Nutt., Aud.

Sylvicola canadensis, Sw., Rich., Bp., Aud.

Mniotilta canadensis, Gray.

Dendroica canadensis, Bd., Sc., and other late authors.

Sylvia pusilla, Wils.

Sylvia leucoptera, Wils.

Sylvia sphagnosa, Bp., Nutt., Aud.

Length, 5.50; wing, 2.60; tail, 2.25.

Hab.—Eastern United States to the Missouri. West Indies. (Baird.)

Two specimens of this striking-looking Warbler are in the Bartram

collection, shot by Mr. Bartram in a field of arrow-root on his farm not many years since. No others are recorded.

18. *Dendroica coronata*, (Linn.) Gray. Yellow-rump Warbler.

Motacilla coronata, Linn.

Sylvia coronata, Lath., Vieil., Wils., Nutt., Aud.

Sylvicola coronata, Sw. & Rich., Aud.

Dendroica coronata, Gray, Bd., Coues, and late writers generally.

Mniotilta coronata, Gray, Reinh.

Sylvia xanthopygia, Vieil.

Length, 5.65; wing, 3.00; tail, 2.50.

Hab.—North America, excepting southwest Territories; in the Northwest, across the continent, thence south along the Pacific coast to Washington Territory, Colorado, Arctic coast, Greenland, Mexico, Central America, West Indies. (Coues.)

Several examples are recorded in "The Naturalist in Bermuda." Three of these were shot on Somerset Island by Captain Tolcher, Fifty-sixth Regiment, out of a flock of more than a hundred birds. In the Bartram collection are four specimens. It was the commonest species I met with in November and December, 1874, in the course of my evening rambles among the cedar groves of Devonshire parish. Here I obtained a few specimens, and could have shot many more had I wished. They were rather shy, and flew rapidly from tree to tree, with a loud "chip" of alarm, showing the brilliant yellow of the rump plainly. Those I shot were all in winter plumage, the yellow crown concealed by brown feathers.

19. *Dendroica castanea*, (Wils.) Bd. Bay-breasted Warbler.

Sylvia castanea, Wils., Bp., Nutt., Aud.

Sylvicola castanea, Rich., Bp., Aud., Hoy.

Mniotilta castanea, Gray.

Rhimanphus castaneus, Cab.

Dendroica castanea, Bd., Sel. & Salv., Lawr., Mayn., Coues.

Sylvia autumnalis, Wils., Nutt., Aud.

Length, 5.00; wing, 3.05; tail, 2.40.

Hab.—Eastern Provinces of North America to Hudson's Bay; Guatemala, south to Isthmus of Darien. Not recorded from Mexico or West Indies. (B. B. & R.)

A young bird in the Bartram collection is the sole representative of the species. It is in obscure plumage, but shows the buffy tint on the sides of the body so characteristic of the species.

20. *Dendroica maculosa*, (Gm.) Bd. Black and Yellow Warbler.*Motacilla maculosa*, Gm.*Sylvia maculosa*, Lath., Vieil., Aud., Nutt.*Sylvicola maculosa*, Sw. & Rich., Aud., Hoy.*Dendroica maculosa*, Bd., and later authors generally.*Sylvia magnolia*, Wils.

Length, 5.00; wing, 2.50; tail, 2.25.

Hab.—Eastern North America to Fort Simpson; Eastern Mexico to Guatemala and Panama; Bahamas; Cuba (very rare). (B. B. & R.)

Mr. Bartram writes to me: "On the 7th May, 1878, I shot a Magnolia Warbler. * * * This is new to the Bermuda lists."

21. *Dendroica discolor*, (Vieil.) Bd. Prairie Warbler.*Sylvia discolor*, Vieil., Bp., Nutt., Aud.*Sylvicola discolor*, Jard. Rich., Bp., Aud., Gosse.*Mniotilta discolor*, Gray.*Dendroica discolor*, Bd. and later authors.*Sylvia minuta*, Wils.

Length, 4.86; wing, 2.25; tail, 2.10.

Hab.—Eastern United States as far north as Massachusetts, west to Kansas; breeds throughout its range; winters in Florida and abundantly in most of the West Indian islands. Not recorded from Mexico or Central America. (Coues.)

Only one, obtained by Colonel Wedderburn at the dockyard, Ireland Island, on the 3d October, 1848.

22. *Dendroica palmarum*, (Gm.) Bd. Yellow Red-poll Warbler.*Motacilla palmarum*, Gm.*Sylvia palmarum*, Lath., Vieil., Bp.*Dendroica palmarum*, Bd. and later authors.*Sylvia petechia*, Wils., Nutt., Aud.*Sylvicola petechia*, Sw. & Rich., Aud., Hoy.*Sylvicola ruficapilla*, Bp.

Length, 5.00; wing, 2.42; tail, 2.25.

Hab.—Eastern Province of North America to Fort Simpson and Hudson's Bay; Bahamas, Jamaica, Cuba, and Saint Domingo, in winter. Not noted from Mexico or Central America. (B. B. & R.)

Two shot by Colonel Wedderburn in Pembroke Marsh, on December 17, 1847, and December 3, 1848, respectively. Mr. Bartram has two other specimens, obtained by himself.

23. *Dendroica pinus*, (Wils.) Bd. Pine-creeping Warbler.*Sylvia pinus*, Wils., Nutt., Aud.*Sylvicola pinus*, Jard., Rich. & Bp., Aud., Woodh.*Rhimamphus pinus*, Bp.*Dendroica pinus*, Bd. and later authors.*Sylvia vigorsii*, Aud.*Vireo vigorsii*, Nutt.

Length, 5.50; wing, 3.00; tail, 2.40.

Hab.—Eastern United States to the Lower Missouri, north to Canada and New Brunswick, but not to Labrador. Not recorded in West Indies, except Bahamas. Bermuda. (Coues.)

Has occurred in considerable numbers. A good many occurred on September 27, 1849, departing again in a few days. Several were captured outside the lantern of the light-house in the dark and rainy night of the 5th September, 1850. On October 15, 1850, Colonel Drummond obtained specimens from a large flock, which he observed coming in from the sea and settling on some trees within the keep at Ireland Island. Mr. Bartram has two specimens, one of which (a male in spring plumage) was shot near his house and brought to him while I was paying him a visit on March 16, 1875. The species would seem, therefore, to visit the islands on both migrations.

Under date 4th February, 1878, Mr. Bartram writes to me: "One dark stormy night last October, a Pine-creeping Warbler flew into the museum; it is now alive and well, and eats bread and milk."

Sub-family GEOTHLYPINÆ.

Genus SEIURUS, Sw.

24. *Seiurus aurocapillus* (Linn.), Sw. Golden-crowned Thrush.

Motacilla aurocapilla, Linn., Gm.

Turdus aurocapillus, Lath., Wils., Nutt., Aud.

Sylvia aurocapilla, Bp.

Seiurus aurocapillus, Sw. & Rich., Aud., Bd., and later authors.

Accentor aurocapillus, Rich.

Enicocichla aurocapilla, Gray.

Henicocichla aurocapilla, Cab. Gundl., Sel.

Turdus coronatus, Vieil.

Length, 6.00; wing, 3.00; tail, 2.40.

Hab.—Eastern Province of North America; west to Platte and Yellowstone, thence to Alaska; winters sparingly in Florida and along the Gulf coast; Mazatlan, West Indies; Mexico; Central America (Coues).

I shot the first recorded specimen on the edge of Devonshire Swamp, on the 19th October, 1874. This brought to light another, shot in the autumn of 1873, and set up in a case with Blue and Red Birds by Gibbs, an old soldier of the Fifty-third Regiment, and an excellent taxidermist, in the service of Lieutenant Johnston, Royal Engineers. I afterwards identified two others, killed a few years ago, in Mr. Bartram's possession. The species was numerous in the autumn of 1874, in and near Devonshire Swamp, and I procured specimens on the 24th October

and on the 12th and 16th December, thus establishing it as a real 'Mudian. I wonder it had hitherto escaped notice; its loud "peche, peche" is very striking, and drew my attention at once to the presence of something new. It was very shy.

25. *Seiurus noveboracensis*, (Gm.) Nutt. Small-billed Water Thrush.

Motacilla noveboracensis, Gm.

Sylvia noveboracensis, Lath., Vieil., Bp.

Turdus (*Seiurus*) *noveboracensis*, Nutt.

Seiurus noveboracensis, Bp., Aud., Bd., and later authors.

Henicocichla noveboracensis, Cab., Sel., Gundl., Sel. & Salv.

Enicocichla noveboracensis, Gray.

Turdus aquaticus, Wils., Aud.

Seiurus aquaticus, Sw. & Rich.

Sylvia anthoides, Vieil.

Seiurus tenuirostris, Sw., Gamb.

Seiurus gossii, Bp.

Length, 6.15; wing, 3.12; tail, 2.40; bill from rectus, .64.

Hab.—Eastern North America, straggling westward along United States boundary to Montana and Washington Territory; Alaska; Arizona; Mexico; West Indies; Central America; Northern South America (Coues).

One of the commonest but most interesting of autumnal visitors. It appears regularly early in October and a few remain all the winter. Throughout October and November there is hardly a mangrove swamp, great or small, whence its sharp but musical "chip" may not be heard at any time during the day. Early in the morning, especially when an ebbing tide has left bare the quaint tangled roots of the mangroves and their muddy surroundings, it is comparatively easy to approach this wary little bird, but later in the day it requires great caution, and a certain amount of activity, to procure a specimen. To persons out of training, requiring strong exercise, I can confidently recommend a protracted "stalk" after *Seiurus* among the mangrove roots, such as I undertook myself before becoming better acquainted with the habits of the species. These birds wag the tail like a *Motacilla*, as they feed on the edges of the tidal pools, and flit from root to root, uttering at times their loud monotonous cry. While waiting for ducks at daylight in the larger swamps, I have seen them within a few yards of me, in happy ignorance of my presence. Colonel Wedderburn says (Nat. in B., p. 27), "Several times, at Riddle's Bay, I have noticed seemingly a larger species of this bird, but never succeeded in killing any of them." This was perhaps the larger-billed variety (or species), *S. ludovicianus*. I did not meet with any specimens myself.

Genus GEOTHLYPIS, Cab.

26. *Geothlypis trichas*, (Linn.) Cab. Maryland yellow-throat.*Turdus trichas*, Linn., Gm.*Sylvia trichas*, Lath., Vieil., Nutt., Ord, D'Orbig.*Geothlypis trichas*, Cab., Bd., and later authors.*Ficedula trichas* & *marilandica*, Briss.*Sylvia marilandica*, Wils., Bp.*Trichas marilandica*, Bp., Ord, Woodh., Hoy.*Trichas personatus*, Sw.*Sylvia roscoe*, Aud.*Trichas roscoe*, Nutt.

Length, 4.40; wing, 2.15; tail, 2.30.

Hab.—North America, from Atlantic to Pacific; Bahamas; Cuba; Jamaica (B. B. & R.).

By no means a frequent visitor, only two specimens being known. The first was shot by Mr. Hurdis in a bushy swamp near the sluice-gates on the 18th October, 1853; the second is in Mr. Bartram's museum, obtained near Stocks Point.

Sub-family SETOPHAGINÆ.

Genus MYIODIOCTES, Aud.

27. *Myiodioctes mitratus*, (Gm.) Aud. Hooded Fly-catching Warbler.*Motacilla mitrata*, Gm.*Sylvia mitrata*, Lath., Vieil., Bp., Nutt., Aud.*Sylvania mitrata*, Nutt., Woodh.*Setophaga mitrata*, Jard., Gray.*Wilsonia mitrata*, Bp., All., Allen.*Myiodioctes mitatus*, Aud., Bp., Selater, Bd., and modern authors.*Syloicola mitrata*, Maxim.*Myioctonas mitratus*, Cab.*Muscicapa cucullata*, Wils.*Muscicapa selbyi*, Aud., Nutt.

Length, 5.00; wing, 2.75; tail, 2.55.

Hab.—Eastern Province of United States, rather southern; Bermuda; Cuba; Jamaica; Eastern Mexico; Honduras; and Guatemala to Panama R. R.; Orizaba; Yucatan (B. B. & R.).

A male shot at Ireland Island by Mr. Abbott, Twentieth Regiment, on March 30, 1847. A female was seen but not obtained.

Genus SETOPHAGA, Sw.

28. *Setophaga ruticilla*, (Linn.) Sw. American Redstart.*Muscicapa ruticilla*, Linn., Gm., Vieil., Wils., Aud.*Setophaga ruticilla*, Sw., Sw. & Rich., and modern authors.*Sylvania ruticilla*, Nutt.*Motacilla flavicanda*, Gm.

Length, 5.25; wing, 2.50; tail, 2.45.

Hab.—Chiefly Eastern North America, north to Fort Simpson, west to Utah, south through Mexico and Central America to Ecuador; West Indies (Coues).

Two in Mr. Bartram's possession, shot by him near his house some few years since. No others are on record.

Family TANAGRIDÆ.

Sub-family TANAGRINÆ.

Genus PYRANGA, Vieil.

29. *Pyranga rubra* (Linn.) Vieil. Scarlet Tanager.

Tanagra rubra, Linn., Gm., Wils., Bp., Nutt., Aud.

Pyranga rubra, Vieil., Sw. & Rich., Jard., Bp., Aud., Gir., and modern authors.

Phænisola rubra, Sw.

Phænicosoma rubra, Cab.

Pyranga erythromelas, Vieil.

Length, 7.40; wing, 4.00; tail, 3.00.

Hab.—Eastern Province of North America, north to Winnepig. In winter, south to Ecuador, Bogota, Cuba, Jamaica, Costa Rica, Vera Cruz. (B. B. & R.)

This handsome bird has visited the Bermudas on its vernal migration on several occasions. Two or three examples were obtained in April, 1850; four were seen, and one shot, in May, 1851. Mr. Bartram has several specimens, male and female, and obtained a splendid male near his house early in May, 1875. One was seen and nearly captured after an exciting hunt by Lieutenant Denison, R. E., at Somerset, on April 25, 1875. Mr. J. M. Jones informs me that a male was shot on the edge of the lagoon at Ireland Island on May 6, 1869; also that another frequented a garden in Smith's Parish for several days at the beginning of May, 1875. The female is such an obscure-looking bird that she doubtless often escapes the notice invariably accorded to her brilliant partner. There is no recorded instance of the occurrence of this species on its southward journey. Captain Rooke, Fifty-third Regiment, and I saw what we took to be a female Scarlet Tanager on October 17, 1874, near Basden's Pond, but we could not get a shot to confirm our suspicion.

30. *Pyranga æstiva*, (Gm.) Vieil. Summer Red-bird.

Muscicapa rubra, Linn.

Tanagra æstiva, Gm., Wils., Bp., Nutt., Aud.

Pyranga æstiva, Vieil., Bp., Lins., Woodh., Sel., and of late writers.

Length, 7.20; wing, 3.75; tail, 3.00.

Hab.—Eastern Province United States, north to about 40°, west to borders of the plains. In winter, south through the whole of Middle America (except the Pacific coast) as far as Ecuador and Peru, Cuba, Jamaica. (B. B. & R.)

The same remarks apply to this species, with reference to its visits to the islands, as to the preceding. It appears to have been especially numerous in April, 1850, when a female was shot on the 9th; a beautiful male, by Colonel Wedderburn, at Peniston's Pond, on the 19th; two by the same gentleman, at Harris's Bay, on the 20th; and several others. Mr. Bartram has a male and two females, one of the latter killed a year or two since. On the 29th of April, 1875, I shot a fine female in Smith's Marsh; it was in wonderful condition, the body being literally coated with layers of orange-colored fat. The stomach was full of the remains of the Bermuda wasp—a most unpalatable-looking morsel. Wilson alludes to the insectivorous habits of this species.

Family HIRUNDINIDÆ.

Sub-family HIRUNDININÆ.

Genus HIRUNDO, Linn.

31. *Hirundo horreorum*, Barton. Barn Swallow.

Hirundo rufa, Vieil., Bp., Nutt., Woodh., Cass., Cab., Brewer.

Hirundo horreorum, Barton, Bd., and of late writers.

Hirundo americana, Wils., Sw. & Rich., Lemb.

Hirundo rustica, Ord., Gir., Jones.

Length, 6.90; wing, 5.00; tail, 4.50.

Hab.—North and Middle America, north to Alaska; Greenland; West Indies. (Coates.)

I shall take the liberty of quoting from the "Naturalist in Bermuda," to illustrate the uncertain appearance of the swallow tribe in the islands. Mr. Hurdis says (p. 68): "I can with safety affirm that from October, 1840, to September 12, 1846, not a swallow of any description came under my observation, though I believe they were sufficiently common in the September of the former year." Colonel Wedderburn says of this species (p. 34): "Rarely seen in April and May, but sometimes numerous in August and September. I have seen it as early as August 1, in the year 1848, at Hamilton, and they were numerous on that day at Hungry Bay and Riddle's Bay. This species was very numerous in the great flight of swallows in September, 1849." A few swallows, probably of this species, appeared in August, 1874, but I was away at the time.

From April 30 to May 11, 1875, there were not a few visitors, and several specimens were obtained. Five of these birds frequented the grassy slopes in the vicinity of Warwick Camp, while I was going through the annual course of musketry there with my company. They disappeared on May 11, without my having been able to procure a specimen.

32. *Hirundo bicolor*, Vieil. White-bellied Swallow.

Hirundo bicolor, Vieil., Bp., Aud., Nutt., Gir., and most writers.

Chelidon bicolor, Less., Bp.

Tachycineta bicolor, Cab., Gundl., Sumich., Allen, Coues.

Herse bicolor, Bp.

Petrochelidon bicolor, Sel., Sel. & Salv.

Hirundo viridis, Wils.

Length, 6.25; wing, 5.00; tail, 2.65.

Hab.—Whole United States, and north to Slave Lake, south to Guatemala; Bermuda; Cuba, common in winter; breeds on table-lands of Mexico; accidental in England.

This Swallow visited the Bermudas in the great flight of September, 1846, when it appeared in considerable numbers. Lieutenant Denison obtained one, shot at St. George's in September, 1875.

Genus COTYLE, Boie.

33. *Cotyle riparia*, (Linn.) Boie. Bank Swallow.

Hirundo riparia, Linn., Gm., Lath., Wils., Bp., Sw. & Rich., Nutt., Aud., Gir., and of earlier authors generally.

Cotyle riparia, Boie, Bp., Woodh., Cass., Cab., and of nearly all late writers.
Hirundo cinerea, Vieil.

Length, 4.75; wing, 4.00; tail, 2.00.

Hab.—Europe; the whole of North America; Bermuda; Cuba; Jamaica; winters from the southern coast southward; not common on the Pacific side; Brazil. (Coues.)

Identical with the European bird. Two specimens were shot by Captain Lye, in September, 1846; and a few seen near Hamilton on August 8, 1847.

Genus PROGNE, Boie.

34. *Progne purpurea*, (Linn.) Boie. Purple Martin.

Hirundo subis, Linn.

Progne subis, Bd., Coues, Sumich., Steph.

Hirundo purpurea, Linn., Gm., Lath., Wils., Bp., Aud., Nutt., Gir.

Progne purpurea, Boie, Bp., Woodh., and later writers.

Hirundo violacea, Gm.

Hirundo caerulea, Vieil.

Hirundo versicolor, Vieil.

Hirundo ludoviciana, Cur.

Length 7.50; wing, 6.00; tail, 3.40.

Hab.—United States and British Provinces, north to Canada and the Saskatchewan; Mexico; Cuba(?); accidental in Great Britain. (Cones.)

This fine bird, a straggler to the British lists, has only appeared on one occasion, during the "entrada" of September, 1849, when it was numerous.

Family AMPELIDÆ.

Sub-family AMPELINÆ.

Genus AMPELIS, Linn.

35. *Ampelis cedrorum*, Vieil. Cedar-bird.

Ampelis garrulus, var β , Linn.

Bombycilla cedrorum, Vieil, Cab.

Ampelis cedrorum, ScL., Bd., and late writers.

Bombycilla carolinensis, Briss., Bp., Aud., Nutt., Gir.

Ampelis carolinensis, Gosse, Bp.

Ampelis americana, Wils.

Bombycilla americana, Sw. & Rich.

Length, 7.25; wing, 4.05; tail, 2.60.

Hab.—North America generally, up to 54° north; Mexico and Central America; Bermuda; Jamaica; Cuba. (Cones.)

Occurs rarely, both on its autumnal and vernal flights. Three were shot out of a flock of about thirty, near Hungry Bay, on October 10, 1847; four on December 17 following, one of which had a few of the brilliant wax-like tips to the secondaries; two out of a flock of twelve in December, 1849; one seen on January 5, 1850; one shot on the 6th and another on the 10th April, 1850; one on December 2, 1851. In addition to these Mr. Bartram has three specimens, obtained at different dates. I did not myself meet with the species, or hear of its occurrence, during my stay. Two were shot out of a flock of five on the 11th, and a third on the 22d September, 1875, in Devonshire Swamp, by Lieutenant Festing, Twentieth Regiment. A male bird of this species was obtained near Prospect, on November 24, 1875.

Family VIREONIDÆ.

Sub-family VIREONINÆ.

Genus VIREO, Vieil.

36. *Vireo noveboracensis*, (Gm.) Bp. White-eyed Vireo.

Muscicapa noveboracensis, Gm.

Vireo noveboracensis, Bp., Nutt., Aud., Gir., Cass., and later writers.

Vireo musicus, Vieil.

Muscicapa cantatrix, Wils.

Length, 4.90; wing, 2.40; tail, 2.20.

Hab.—United States west to base of Rocky Mountains; south to Guatemala; Very rare in Cuba. Abundant and resident in the Bermudas. (B. B. & R.)

The smallest and one of the commonest resident Bermuda birds, familiar to all through its sprightly ways, loud song, and astounding impudence. It is termed locally, "chick-of-the-village," or, "chick-choo-willie," from its note. This is, however, very variable, and hardly any two birds give it the same rendering. One has a prefatory "chick," in addition; another tacks the extra "chick" on at the end of his version; while others cut it short, or jumble it all up together at random. One particular variety is "ginger-beer-quick," a call very much adapted to the climate of Bermuda. In short, there is no end to the variations; and a stranger might well imagine, as I did myself at first, that there was more than one species present. It was some little time before I settled the matter to my own satisfaction by careful observation of every "chick" I heard singing, as I expected to meet with *V. gilvus* or *V. belli* among the numerous musicians. The color of the iris increased my difficulty, as I found it to be brownish, brownish-gray, or gray—rarely white, as stated by authors. I presume it is only fully adult birds that show the real white iris; young birds have it decidedly brownish, and I have seen a female sitting on eggs with an undeniable brownish-gray "cast" in her bright little eye. It would be a waste of time and valuable space to describe the pretty pensile nest of this species, so familiar to all ornithologists. I have found it usually from three to twelve feet above the ground, in cedars, mangroves, Bermuda "holly," pomegranate, and lemon trees, but most commonly in cedars. I never met with more than *three* eggs or young in one nest in the islands; authors assign four or five to the genus. The eggs average .71 inch by .52 inch, white, with a few dark-brown or black dots; some are entirely white. The young at first have the yellow of the wing bars and forehead very pale and dingy. This is a sad little torment to the collector. It comes hissing and scolding within a foot of one's head, puffing itself out with malignant fury. I have touched one with my gun in the thick bushes before it would budge an inch. And when one is on the *qui vive* for rarities among the big cedars, the little wretches will come from all parts to irritate and deceive one, playing all sorts of antics on the topmost branches, apparently imitating the movements of a *Dendroëca* or other *Sylvicolidae*, in order to induce one to waste a charge on them. Several times they succeeded with me; and on one occasion,

the bird having lodged at the top of a very ugly-looking tree, I tore my hands and clothes to pieces in my anxiety to secure the supposed prize. But in spite of this I have a great regard for the cheerful, restless little fellows, whose presence does so much to relieve the monotony of the everlasting cedars. They are very dexterous in catching insects among the foliage, their manner of feeding seeming to be intermediate between that of a Flycatcher and a Warbler. You can hear the "snip" of their mandibles as they secure their prey for a considerable distance. I have seen one catching flies off the back of a cow, jumping vigorously at them from the ground, and "snipping" them off neatly as they buzzed round the recumbent animal. Mr. Hurdis says (Nat. in B., p. 71): "In September it delights to feed on the small white berries of the sweet-scented *Tournefortia*, and it is also fond of the small fiery capsicum, known by the name of 'bird-pepper,' the pods of which it plucks and swallows entire." It is on record that the newly-fledged young of this species have been found entangled in the meshes of the web of the "silk" spider *Epëira clavipes*. These webs are of great size and strength, extending for many feet between adjoining cedars, and the number of them among the woods in summer and autumn is almost incredible. In all my rambles, however, I never met with an instance of poor little *Vireo* having walked into *Epëira's* parlor.

Genus VIREOSYLVA, Bonap.

37. *Vireosylva olivacea*, (Linn.), Bp. Red-eyed Vireo.

Muscicapa olivacea, Linn., Wils.

Lanius olivaceus, Licht.

Vireo olivaceus, Vieil., Bp., Sw., And., Bd.

Vireosylva olivacea, Bp., Reinh., Sel., and late writers.

Vireo virescens, Vieil., Gray.

Vireo bogotensis, Bryant, Lawr.

Length, 6.33; wing, ♂, 3.33; tail, 2.50.

Hab.—Whole of Eastern North America, west to base of Rocky Mountains, south to Panama and Bogota; very rare in Cuba, only West Indian locality; accidental in England; Trinidad. (B. B. & R.)

The first recorded specimen was brought to me in the flesh on the 14th October, 1874. It had just been captured in the officers' quarters at Prospect Camp. In March, 1875, I identified three specimens in Mr. Bartram's collection, shot by himself at different times near Stocks Point. Mr. Bartram informs me that he shot one on the 13th October, 1878.

Family LANIIDÆ.

Sub-family LANIINÆ.

Genus COLLURIO, Bd.

38. *Collurio borealis*, (Vieil.) Bd. Great Northern Shrike.*Lanius borealis*, Vieil., Sw. & Rich., Aud., Gir., Cass., &c.*Lanius excubitor*, Forst., Wils., Aud.*Collyrio borealis*, Bd., Cooper & Suck., Coues & Prent., Hayd., Dall & Bann.*Collurio borealis*, Bd., Coues, Cooper, &c.*Lanius septentrionalis*, sp., Cass., Murray.*Collyrio chemungensis*, Gregg.

Length, 9.85; wing, 4.50; tail, 4.80.

Hab.—North America, in winter south to about 35°; Alleghanies, breeding; Bermuda. (Coues.)

Not a great many have occurred, though it would appear to visit the islands on both migrations. One was shot by Dr. Cole, Twentieth Regiment, on October 31, 1846; one by Mr. Hurdis, January 23, 1847; another by Colonel Wedderburn, near Harris Bay, March 12, 1850; and a fourth by Mr. J. M. Jones, on the "Model" farm, Smith's parish, in January, 1872. Besides these, there are three specimens in Mr. Bartram's collection. Most of these above-mentioned examples were in immature plumage. One in Lieutenant Denison's collection was shot near the garrison instructor's house, at Prospect, on the 1st January, 1876.

It is strange that the other North American species, *C. ludovicianus*, of more southerly distribution on the continent than *C. borealis*, should not have been observed in Bermuda.

Family FRINGILLIDÆ.

Sub-family COCCOTHAUSTINÆ.

Genus LOXIA, Linn.

39. *Loxia curvirostra* var. *americana*, (Wils.) Coues. American Red Crossbill.*Loxia curvirostra*, Forster, Bp., Nutt., Aud., Gir., Trippe.*Loxia curvirostra* var. *americana*, Coues, B. B. and R.*Curvirostra americana*, Wils., Bd., Coop. & Suck., and most later U. S. authorities.*Loxia americana*, Bp., Newb., Lawr., Finsch.

Length, 6.00; wing, 3.30; tail, 2.25.

Bull. Nat. Mus. No. 25—13

Hab.—North America generally, coming southward in winter. Resident in the Alleghany and Rocky Mountains. (B. B. & R.)

Of this species Colonel Wedderburn says: "A specimen of this bird was captured in the dockyard at Ireland Island, January 20, 1850, and got quite tame, and lived for several days in my room; but poisoned itself by eating part of a composite candle, which it had cut nearly in half with its strong bill during the night. I shot three specimens near Mr. Ewing's house, April 5, 1850, and saw a small flock on several occasions near Pitt's Bay, but they were so shy I could not get near them. They disappeared early in May." Mr. Bartram has several specimens. On November 17, 1874, three were observed on some cedar trees at Prospect Camp. Two males were shot among some sage bushes, near the shore at Warwick, by Gibbs, on the 25th of that month; and another male was obtained at Prospect about the same time. These may have been the trio originally seen. The stomachs of the two Warwick birds, on examination by myself, proved to be crammed with small green caterpillars, and contained no trace of seeds. The insectivorous nature of the Crossbill is not mentioned by Wilson; it is alluded to by Dr. Saxby in the "Birds of Shetland." This species must visit Bermuda both going and returning.

40. *Loxia leucoptera*, Gm. White-winged Crossbill.

Loxia leucoptera, Gm., Bp., Sw. & Rich., Nutt., Aud., Gir., Gould, Lawr., Finsch, B. B. & R.

Curvirostra leucoptera, Wils., Bd., and many U. S. authors.

Loxia falcirostra, Lath.

Crucirostra leucoptera, Brehme.

Length, 6.25; wing, 3.50; tail, 2.60.

Hab.—Northern parts of North America generally; Greenland; England (accidental). (B. B. & R.)

A less frequent visitor than the preceding, on its northward journey only. A fine male was killed on May 11, 1852, by a boy who had another in his possession; date unknown. An officer of the Fifty-sixth Regiment shot one, a female, at Somerset, in March, 1852. Mr. Bartram has obtained a pair, male and female. This bird has occurred several times in Great Britain, and it is somewhat remarkable that the preceding species, *C. americana*, has not yet paid us a visit. I expect it will find its way across the Atlantic some day, and share the fate of every unfortunate straggler to our inhospitable shores.

Genus *ÆGIOTHUS*, Cab.41. *Ægiothus linaria*, (Linn.) Cab. Red-poll Linnet.*Fringilla linaria*, Linn., Gm., Wils., Temm., Bp., Nutt., Aud.*Passer linaria*, Pall.*Linota linaria*, Bp., Holb.*Ægiothus linarius*, Cab., Bd., Coues, and late writers.*Linaria minor*, Sw. & Rich., Aud., Gir., Trippe.*Fringilla borealis*, Vieil.*Ægiothus fuscescens*, Coues, Elliot.

Length, 5.50; wing, 3.10; tail, 2.70.

Hab.—The typical form in North America from Atlantic to Pacific, ranging irregularly southward in flocks in winter to the Middle States (sometimes a little beyond), and corresponding latitudes in the West. No late record of breeding in the United States. (Coues.)

Only recorded previously in 1847 and 1850. Two were obtained, February 8 and October 11, in the former year. In March, 1850, flocks of this bird appeared in the neighborhood of St. George's, and several specimens were obtained there and elsewhere throughout the islands. A goodly number visited the islands in small flocks in January, 1875; these were very tame at first, but soon became shy. Specimens were obtained during the month at all parts of the islands.

Genus *CHRYSOMITRIS*, Boie.42. *Chrysomitris pinus*, (Wils.) Bp. Pine Linnet.*Fringilla pinus*, Wils., Bp., Nutt., Aud.*Linaria pinus*, Aud., Gir.*Chrysomitris pinus*, Bp., Bd., Coop. & Luck., and later writers.*Chrysomitris macroptera*, Dubus., Bp.

Length, 4.75; wing, 3.00; tail, 2.20.

Hab.—North America from Atlantic to Pacific; Vera Cruz, plateau and alpine region. (B. B. & R.)

Two specimens in Mr. Bartram's collection are the only ones on record. They were obtained near Stocks Point.

Genus *PLECTROPHANES*, Meyer.43. *Plectrophanes nivalis*, (Linn.) Meyer. Snow Bunting.*Emberiza nivalis*, Linn., Forster, Gm., Lath., Wils., Bp., Nutt., Aud.*Emberiza (Plectrophanes) nivalis*, Bp., Sw. & Rich.*Plectrophanes nivalis*, Meyer, and authors generally.*Emberiza montana*, Gm., Lath.*Emberiza mustelina*, Gm.*Emberiza glacialis*, Lath.

Length, 6.75; wing, 4.35; tail, 3.05.

Hab.—Arctic America and Greenland, and corresponding latitudes in the Old World; irregularly southward in winter in the United States to about 35° in roving flocks. (Coues.)

This is a pretty constant visitor, seldom failing to make its appearance, in large or small numbers, in December or January. They were particularly numerous in 1850. I am credibly informed that of late years they have been seen in considerable numbers feeding on the parade ground and round about the stables, like sparrows, at Prospect Camp. One was seen there in December, 1874. Three, of which I procured one, frequented the Walsingham end of the Causeway in January, 1875. Others were seen at St. George's and elsewhere about the same time. This bird has not appeared in spring.

Genus PASSER, Briss.

44. *Passer domesticus*, Deg. & Gerbe. European House Sparrow.

Fringilla domestica, Linn.

Pyrgita domestica, Cuv.

Passer domesticus, Deg. & Gerbe, and European authors generally.

Length, 6.00; wing, 2.85; tail, 2.50.

Hab.—Europe; Asia; North Africa; Madeira.

Some few years ago a number of these birds were imported from New York (where they are now numerous), and turned out at St. George's; but many of them subsequently disappeared, probably victims to the cats which swarm in all parts of the islands. The remainder, however, appear to be flourishing, and in the spring of 1875 there were several nests in the new barracks above the town. A second importation, from New York also, took place in September, 1874, about fifty birds being liberated in the vicinity of Hamilton. These soon scattered in all directions, but about a dozen took up their quarters in the garden of the court-house at Hamilton, and could be seen there daily during the winter following. I have no doubt they will increase and multiply after their manner, and in time become as much a nuisance as they are now a curiosity. I certainly question the propriety of introducing these quarrelsome birds (for the sake of the war they wage on the insect tribe during the breeding season *only*) into the aristocratic society of the Blue and Red Birds, which they will infallibly drive, in course of time, out of the town gardens and inclosures altogether.

NOTE.—I may here mention that I observed a single specimen of the European Goldfinch, *Carduelis elegans*, near Harrington Sound, in April, 1875; it was very wild, and I could not get near it, but I imagine it

must have been an escaped prisoner. This species is reported to have occurred in Massachusetts (Allen, Am. Nat. iii., p. 635), but the same explanation doubtless applies.

Sub-family SPIZELLINÆ.

Genus PASSERCULUS, Bp.

45. *Passerculus savanna*, (Wils.) Bp. Savanna Sparrow.

Fringilla savanna, Wils., Nutt., Aud.

Linaria savanna, Rich.

Emberiza savanna, Aud., Gir.

Passerculus savanna, Bp., Cab., Bd., and later writers generally.

Ammodromus savanna, Gray.

Passerculus alaudinus, Bp., Bd., Heerm., Coues, Dress., Elliot, &c.

Zonotrichia alaudina, Finsch.

Length, 5.50; wing, 2.70; tail, 2.10.

Hab.—Eastern North America to the Missouri plains, and northwest to Alaska; Cuba (winter). (B. B. & R.) Mexico. (Coues.)

Only two on record. Colonel Wedderburn killed one in Pembroke Marsh, April 11, 1850; I shot one at Shelly Bay Marsh on January 29, 1875.

Genus POOCÆTES, Bd.

46. *Poocætes gramineus*, (Gm.) Bd. Bay-winged Bunting.

Fringilla graminea, Gm., Bp., Aud., Nutt.

Emberiza graminea, Wils., Aud., Maxim., Trippe.

Zonotrichia graminea, Bp., Newb., Heerm.

Poocætes gramineus, Bd., Hayd., B. B. & R.

Poocætes gramineus, Coues, and later authors generally.

Length, 6.25; wing, 3.10; tail, 2.50.

Hab.—United States, from Atlantic to Pacific, north to the Saskatchewan at least; winters in countless multitudes in the Southern States. (Coues.)

One shot by Captain M'Leod at St. George's, October 25, 1849. Lieutenant Denison fell in with a small party of these birds, and shot one of them at Whale Bay on the 9th of September, 1876.

Genus COTURNICULUS, Bp.

47. *Coturniculus henslowi*, (Aud.) Bp. Henslow's Bunting.

Emberiza henslowi, Aud., Gir.

Fringilla henslowi, Nutt.

Coturniculus henslowi, Bp., Bd., and late U. S. authors.

Ammodromus henslowi, Gray.

Length, 5.25; wing, 2.15; tail, 2.15.

Hab.—Eastern United States as far north as Massachusetts; westward to the Loup Fork of Platte. (B. B. & R.)

"Mr. Hurdie shot one specimen out of a small flock of these birds in Pembroke Marsh, on December 2, 1850. They had frequented the dense reeds and rushes for a fortnight previously." (Nat. in B., p. 30.)

Genus MELOSPIZA, Bd.

48. *Melospiza palustris*, (Wils.) Bd. Swamp Sparrow.

Fringilla georgiana, (Lath., ?), Nutt.

Fringilla palustris, Wils., Bp., Aud.

Fringilla (Spiza) palustris, Bp.

Passerculus palustris, Bp.

Ammodromus palustris, Aud., Gir., Putn., Trippe.

Melospiza palustris, Bd., and later authors.

Helospiza palustris, Bd., Allen.

Length, 5.75; wing, 2.40; tail,

Hab.—Eastern North America, from the Atlantic to the Missouri; north to Fort Simpson. (B. B. & R.)

A solitary example was obtained in Pembroke Marsh on December 3, 1849. I saw a bird in the Shelley Bay marshes in January, 1875, which I am almost certain belonged to this species, but I could not get a shot.

Genus JUNCO, Wagler.

49. *Junco hyemalis*, (Linn.) Selater. Eastern Snow-bird.

Fringilla hyemalis, Linn., Bp., Lw. & Rich., Aud., Maxim.

Emberiza hyemalis, Linn., Lath.

Struthus hyemalis, Bp., Woodh.

Nipheca hyemalis, Aud., Gir., Putn., Trippe.

Junco hyemalis, Sel., Bd., and later writers.

Fringilla hudsonia, Forster, Gm., Wils.

Fringilla nivalis, Wils., Nutt.

Length, 6.25; wing, about 3.00.

Hab.—Eastern United States to the Missouri, and as far west as Black Hills; stragglers at Fort Whipple, Arizona, and mountains of Colorado. (B. B. & R.)

Two in the collection of Mr. Bartram were shot by him at Stocks Point.

Sub-family PASSERELLINÆ.

Genus PASSERELLA, Sw.

50. *Passerella iliaca*, (Merr.) Sw. Fox Sparrow.

Fringilla iliaca, Merr., Gm., Bp., Nutt., Aud., Putn., Trippe.

Fringilla (Zonotrichia) iliaca, Sw. & Rich.

Passerella iliaca, Sw., Bp., Bd., and late writers.

Fringilla rufa, Wils., Licht.

Fringilla ferruginea, Wils.

Passerella obscura, Verr.

Length, 7.50; wing, 3.50; tail, 2.90.

Hab.—Eastern province of North America, north 68° and Yukon; breeds from British Provinces northward; winters in Middle States sparingly, in the Southern States very abundantly; Western United States only to the edge of the central plains; accidental in California. (Coues.)

Only one yet obtained; shot by Mr. Bartram in a bush near his house a few years since.

Sub-family SPIZINÆ.

Genus GONIAPHEA, Bowditch.

51. *Goniaphea ludoviciana*, (Linn.) Bowd. Rose-breasted Grosbeak.

Loxia ludoviciana, Linn., Wils.

Fringilla ludoviciana, Bp., Nutt., Aud.

Guiraca ludoviciana, Sw., Bp., Bd., and late writers.

Coccothraustes (Guiraca) ludoviciana, Sw. & Rich.

Goniaphea ludoviciana, Bowd., Allen, Coues.

Coccyborus ludovicianus, Aud., Putn., Gir., Maxim., Trippe.

Hedymeles ludovicianus, Cab., Selater., Lawr., Allen, B. B. & R.

Coccothraustes rubricollis, Vieil.

Loxia rosea, Wils.

Loxia obscura, Gm., Lath.

Fringilla punicea, Gm., Lath.

Length, 8.50; wing, 4.15.

Hab.—Eastern Province of North America, north to Labrador and the Saskatchewan; breeds from the Middle States northward; winters in Mexico and Central America; south to Ecuador; Cuba. (Coues.)

A female bird of this species was shot by Colonel Drummond on the 9th October, 1849, near St. George's, and a fine male by Mr. Hurdis on the 15th April, 1850. Mr. Bartram has four specimens, one of which is a male in immature plumage. A female was caught by a cat in the town of Hamilton on the 16th October, 1874. This species appears to visit Bermuda twice.

Genus CYANOSPIZA, Bd.

52. *Cyanospiza cyanea*, (Linn.) Bd. Indigo Bird.

Tanagra cyanea, Linn.

Emberiza cyanea, Gm.

Fringilla cyanea, Wils., Bp., Nutt., Aud.

Passerina cyanea, "Vieil," Gray.

Spiza cyanea, Bp., Aud., Gir., Woodh., Putn., Sel., Russ.

Cyanospiza cyanea, Bd., Sel. & Salv., Sel., and late author

Cyanoloxia cyanea, Bp.

Length, 5.75; wing, nearly 3.00.

Hab.—Eastern United States to the Missouri; south to Guatemala; Oaxaca; Cordova; Guatemala; Cuba; Costa Rica; Vera Cruz (B. B. & R.).

I had the pleasure of introducing this species into the Bermuda lists, the first specimen being a female shot near Devonshire Church, on January 14, 1875. In March following I examined an immature male, shot by Mr. Bartram on the 1st of that month, and also unearthed two dingy female specimens in his collection, killed some years previously. I obtained a female in Devonshire Marsh on the 8th, a young male on the 11th, and another on the 22d of March, and one or two others were subsequently procured in the same locality. There appeared to have been a regular "entrada" of them, and it was remarkable how pertinaciously they stuck to certain cedar groves round about Devonshire Church. I saw many others, and watched the changes of plumage of the male birds with great interest. By the end of April they had acquired the rich blue livery of the adult, and rivalled the Blue Bird in brilliancy of coloring. Lieutenant Tallents, of the Twentieth Regiment, shot a splendid specimen on April 29. This was the last we saw, and I imagine they all departed shortly afterwards, though we fondly hoped they might stay to breed. I found them easily approached at first, but when once disturbed they flew very rapidly away in the thick cedars. Their call-note was a loud, harsh "chee" or "tzee."

Genus CARDINALIS, Bp.

53. *Cardinalis virginianus*, (Briss.) Bp. Red-bird; Cardinal Grosbeak.

Coccothraustes virginianus, Briss.

Cardinalis virginianus, Bp., Woodh., Bd., Maxim., and late authors.

Loxia cardinalis, Linn., Gm., Lath., Wils.

Coccothraustes cardinalis, Vieil.

Fringilla cardinalis, Bp., Nutt., Aud.

Pitylus cardinalis, Aud., Gir., Hoy.

Length, 8.50; wing, 4.00; tail, 4.50.

Hab.—More southern portions of the United States to the Missouri. Probably along the valley of Rio Grande to the Rocky Mountains. (B. B. & R.)

The well-known Red Bird of Bermuda is an abundant resident throughout the islands, everywhere conspicuous by its brilliant plumage and loud but not unmusical song. This bird is a general favorite with all classes, and in great esteem as a cage-bird. Formerly considerable numbers were caught by the "colored" boys in the neat trap depicted in "The Naturalist in Bermuda"—an introduction, as I am informed, by Mr. J. M. Jones, from Somersetshire, and not a 'Mudian invention. Fortunately, however, there are now stringent local laws for the protection of the resident birds, and these traps are seldom seen. I have tried in

vain to bring up the young from the nest. The Red Bird breeds twice a year in Bermuda. Fresh eggs have been found as early as the 1st April, and I find in my notes that I saw young birds just able to fly on the 19th; but these are exceptional cases. As a rule, the two clutches of eggs are deposited about April 10 and May 30, respectively. The eggs are three to five in number, averaging 1.00 inch x .73 inch. They vary much in size and markings, but are usually greenish white, irregularly marked with few purplish and many amber blotches. The nest is bulky, built of twigs and roots, lined with dry grasses. This lining alone serves to distinguish some of the nests from those of the Cat Bird, which they much resemble; they are usually at a greater elevation, however, and are never ornamented with rags or paper. The parent birds are extremely solicitous in bringing up their offspring, and attend them assiduously long after they are able to fly, betraying their anxiety by much "tick-tick"-ing, flirting of tails, and raising of crests. To see a fine old paterfamilias in all the glory of his rich vermilion garments, tail and crest in air, now on a post, now on an oleander or cedar bough, all the while uttering his sharp "tick" of alarm, while the more sober-colored mother is ministering to the appetites of the children, is a great treat, and will ever be associated in my memory with the hot sun, the white houses, dark cedars, and fragrant sage-bushes of Bermuda. The young resemble the female, being ashy-brown, paler below, with evident traces of the red on the crest, wings, tail, and under parts. I have mentioned the "tick," or call-note of this species. The song is exceedingly variable, consisting of a series of musical whistles. There is also a strange "whir-r-r-r," like a large bird suddenly rising on the wing, which is very peculiar. A most remarkable fact is that the notes are changed according to season. Mr. J. M. Jones called my attention to this too late, unfortunately, for me to make any lengthened study of the changes; but I heard sufficient to satisfy myself of their occurrence. Thus, in December and January nearly every songster I listened to was "way-too-"ing at the top of his voice, and I occasionally heard the peculiar "whir-r-r-r." Later on "way-too" became less frequent, being replaced by the monotonous "tew, tew," and other notes. A more careful and lengthened series of observations would be of considerable interest. In spring the Red Bird commences to sing at daybreak, considerably before the Blue Bird. A wounded Red Bird can give the unwary collector a most painful nip with his strong beak. In spite, however, of his strength,

he allows himself to be driven ignominiously from his nest by the smaller Blue Bird, as already mentioned. The skin of this species is remarkably delicate, almost resembling tissue-paper. The rich vermilion plumage soon fades when exposed to light.

In proof of the migratory nature of this species Mr. Bartram writes to me, on the 27th of April, 1878, as follows: "Captain Tupper, of the barque *Continental*, belonging to the State of Maine, put in here in distress on a voyage from Brunswick, Ga., on or about the 12th of this month. He tells me that one of our Red Birds came on board his ship and was caught 350 miles to the westward of Bermuda; the wind had been eastward for some days; they also caught a Sandpiper the same day, and they were both confined together in a basket; but, as they could not live together without fighting, they were turned adrift and allowed to go their way."

Family ICTERIDÆ.

Sub-family AGELAINÆ.

Genus DOLICHONYX, Sw.

54. *Dolichonyx oryzivorus*, (Linn.) Sw. Bob-o-link; Rice-bird.

Emberiza oryzivora, Linn., Gm., Lath., Wils.

Passerina oryzivora, Vieil.

Dolichonyx oryzivorus, Sw., Bp., Aud., Gould, Gir., and late authors.

Icterus agripennis, Bp., Nutt., Aud.

Dolichonyx agripennis, Rich.

Length, 7.70; wing, 3.83; tail, 3.15.

Hab.—Eastern North America, north to Saskatchewan, west to Rocky Mountains and somewhat beyond; Utah, Nevada, Wyoming; south to Bolivia, La Plata, &c., Galapagos, West Indies, Central and South America. (Coues.)

Mr. Hurdis says of this bird: "The Rice Bird is not known to visit the Bermudas on its vernal flight, although in September and October it seldom fails of being found there, generally in small flocks, and on one occasion in considerable numbers. They frequent the marshes, where the ripe panicles of seed from the reeds and sedge offer an ample abundance of their favorite food." And Colonel Wedderburn remarks: "During some years this bird is not uncommon, but always found in winter plumage. They are so extremely fat that it is almost impossible to preserve them." I have little to add to the above notes, except that one of Mr. Bartram's specimens is a male in imperfect summer plumage.

I never met with the species myself, but they were familiar to many of my friends. They did not visit the Bermudas in the autumn of 1874, but were numerous in September, 1875.

Genus *MOLOTHRUS*, Sw.

55. *Molothrus pecoris*, (Gm.) Sw. Cow-bird; Cow Blackbird.

Fringilla pecoris, Gm., Lath., Licht., Sabine.

Emberiza pecoris, Wils.

Passerina pecoris, Vieil.

Icterus pecoris, Bp., Nutt., Aud.

Molothrus pecoris, Sw. & Rich., Bp., Aud., Gir., Bd., Trippe, and of writers generally.

Molobrus pecoris, Sundevall.

Molothrus ates, Gray.

Fringilla ambigua, Nutt.

Length, 8.00; wing, 4.42; tail, 3.40.

Hab.—Throughout temperate North America, north to 68°; winters in great numbers in the Southern States. (Coues.)

In Mr. Bartram's collection there is one example of this singular bird, which takes the place of our European Cuckoo in North America, building no nest, but depositing its eggs by stealth in the nests of Warblers, Vireos, Sparrows, &c. This solitary specimen is a male. It was shot at Stocks Point by Mr. Bartram.

Sub-family *ICTERINÆ*.

Genus *ICTERUS*, Auct.

56. *Icterus baltimore*, (Linn.) Daud. Baltimore Oriole; Golden Robin.

Oriolus baltimore, Linn., Gm., Wils.

Icterus baltimore, Daud., Bp., Nutt., Aud., Bp., and of late writers generally.

Yphantis baltimore, Vieil., Bp., Woodh.

Hyphantis baltimore, Cab., Lawr.

Icterus baltimorensis, Bp., Schl. & Salv., Coues, Trippe.

Length, 7.50; wing, 3.75.

Hab.—United States east of Rocky Mountains, north regularly to British Provinces; passes to Mexico and Central America; Cuba (Coues).

"Captain Tolcher, Fifty-sixth Regiment, shot one of these birds early in October, 1854, at Somerset. Mr. Hurdis found it amongst his collection of skins on the 20th of the same month, when Captain Tolcher assured him that Mr. Harford, of his regiment, had killed another specimen about the same time, which, from being very much mutilated, he had unfortunately thrown away." (Nat. in B., p. 27.) A third example, a male in splendid plumage, is in my own collection. I shot it near Hungry Bay on April 28, 1875. The bill and feet of this bird were bright livid blue.

Family CORVIDÆ.

Sub-family CORVINÆ.

Genus CORVUS, Linn.

57. *Corvus americanus*, Aud. American common Crow.*Corvus corone*, Wils., Bp., Sw. & Rich., Nutt.*Corvus americanus*, Aud., Bp., Nutt., Maxim., Gir., and of authors generally.

Length, 19.00 to 20.00; wing, 13.00 to 13.50; tail, about 8.00.

Hab.—Temperate North America, excepting, probably, most of the high central plains and the Southern Rocky Mountains, where the Raven abounds (Coues). Bermuda (resident).

The early history of this bird, so far as the Bermudas are concerned, is somewhat obscure. In Smith's "History of Virginia" (to which colony Bermuda at one time belonged), date 1623, Crows are mentioned as being numerous in the islands. Colonel Wedderburn says, however (Nat. in B., p. 33): "A few of these birds are generally to be seen between the light-house and Hamilton. I have never found their nests, but they are known to have bred, as a few young Crows were observed near Warwick Church during the first week of April, 1849. It is supposed that they were introduced from Nova Scotia some few years ago." Mr. Hurdis did not, apparently, find the species numerous, for he says (Nat. in B., p. 66): "In August, 1854, eleven of these Crows were observed associating together at Gibbs Hill by the late Colonel Oakley, Fifty-sixth Regiment. This was double the number which had hitherto frequented those parts, and arose, doubtless, from the young of that season." It is somewhat difficult to reconcile the above evidence. Can the species, once numerous, have become extinct, and have then been introduced again? This is possible, but I am inclined to the belief that there have been Crows, more or less, in Bermuda since 1623, their wary nature and their partiality for the dense cedar groves causing them to have been but little noticed. However it may be, they are numerous now; so much so that a price has been set on their devoted heads by a recent enactment—half-a-crown a bird, and sixpence an egg. That this is a wise and necessary measure is universally conceded, as they do much damage in the breeding season by destroying young poultry, and the eggs and young of the other resident birds. As is well known, this species is gregarious, except during the actual time of breeding. As soon as the young are well able to fly the scattered families consort

together. I have seen as many as sixteen in one flock in June. Three or four are commonly seen together in winter, when they frequent the rocky shores in search of shell-fish, &c. At the approach of the breeding season they separate into pairs, and select the most retired cedar groves for their nesting places, the same couple resorting to a particular spot for many years if undisturbed. The nest is a bulky structure of sticks and cedar bark, warmly lined with the latter material and with goats' hair; it is usually in a wide fork, against the trunk, and never very high up. Eggs, usually four, exactly like those of our European Crows. I have found as many as half a dozen nests, in various stages of dilapidation, in the same clump of trees—the work, doubtless, of the same pair. They seem invariably to build a fresh one every year. Only one brood appears to be raised, leaving the nest about the end of May. The earliest nest I heard of was one containing four fresh eggs on April 3, 1875. Lieutenant Denison and I found five young birds in one nest, two of which were somewhat less advanced in feathering than the remainder; and, as we were mobbed all the time we were at the nest by four old Crows, we came to the conclusion that the nest must be common to both pairs; rather an odd thing when one considers the solitary breeding habits of the species. Mr. Bartram has a specimen measuring $21\frac{1}{2}$ inches in length, which we at first thought must be a Raven, *C. corax*, particularly as it did not mix with the other crows, and was shot on a small island it frequented; but subsequent examination inclined me to believe that it was only an unusually large bird, perhaps a little stretched in stuffing. Ordinary specimens measure 18 to 20 inches.

Suborder CLAMATORES.

Family TYRANNIDÆ.

Sub-family TYRANNINÆ.

Genus TYRANNUS, Cuv.

58. *Tyrannus carolinensis*, (Gm.) Temm. King-bird; Bee-Martin.

Lanius tyrannus, Linn., Gm., Lath.

Lanius tyrannus, var. *carolinensis et ludovicianus*, Gm., Lath.

Tyrannus carolinensis, Temm., Cab., Bd., and later writers.

Muscicapa rex, Bart.

Muscicapa tyrannus, Wils., Bp., Nutt., Aud.

Tyrannus pipiri, Vieil., Cab., ScL., Gundl., Coues, ScL. & Salv.

Tyrannus intrepidus, Vieil., Sw., Sw. & Rich., Bp., Woodh., ScL.

Muscicapa animosa, Licht.

Tyrannus leucogaster, Stephens.

Tyrannus vieillotii, Sw.

Length, 8.50; wing, 4.65; tail, 3.70.

Hab.—North America at large, north to 57° or farther, west to Rocky Mountains, beyond which only observed in Washington and Oregon Territories and British Columbia; winters on extreme southern border, and thence into Mexico, Central and South America to Peru; Cuba. (Cones.)

Recorded as very numerous in all the swamps in 1850, but not mentioned as occurring at other times, though Mr. Bartram has one or two specimens of a later date. It would appear to be only a spring visitant. A considerable number appeared in April, 1875, a small band of these attaching themselves to the Devonshire and Hungry Bay district, where several specimens, male and female, were obtained. These were all immature, or rather in winter plumage, with the flame-colored head-patch concealed by black tips to the feathers. Lieutenant Denison observed several at Hungry Bay on the 22d September, 1875, but was unfortunately unable to procure a specimen and thus establish the fact of the species visiting Bermuda on its southward journey.

59. *Tyrannus dominicensis*, Rich. Grey King-bird.

Tyrannus dominicensis, Briss., Rich., Bd.

Lanius tyrannus, var. β *dominicensis*, Gm.

Muscicapa dominicensis, Aud.

Melittarchus dominicensis, Cab.

Tyrannus griseus, Vieil., Sw., Bp., Sel.

Tyrannus matutinus, Vieil.

Length, 8.00; wing, 4.65; tail, 4.00.

Hab.—South Carolina coast, accidental; Florida Keys and West Indies; Nicaragua; New Granada; Cuba; Jamaica. (B. B. & R.)

Only three specimens are on record, viz., one obtained by Colonel Wedderburn in Mr. Hurdis's garden on March 30, 1850, and two others on St. David's Island on April 15, 1850.

Genus *CONTOPUS*, Cab.

60. *Contopus borealis*, (Sw.) Bd. Olive-sided Flycatcher.

Tyrannus borealis, Sw.

Myiobius borealis, Gray.

Contopus borealis, Bd., and later authors.

Sayornis borealis, Wheat.

Pyrocephalus (Contopus) borealis, Gray.

Muscicapa inornata, Coop. & Nutt., Nutt.

Muscicapa cooperi, Nutt. Aud., Putn.

Tyrannus cooperi, Bp., Nutt., Reinch.

Tyrannula cooperi, Bp.

Contopus cooperi, Cab.

Contopus mesoleucus, Sel., Sumih.

Length, 7.50; wing, 4.33; tail, 3.30.

Hab.—Entire temperate North America; Mexico; Greenland; rare in Middle and Southern Atlantic States; South to Central America. (Coues.)

Mr. Bartram has one, shot by himself on his farm not many years since.

61. *Contopus virens*, (Linn.) Cab. Wood Pe-wee.

Muscicapa virens, Linn., Gm., Lath., Licht., Bp., Nutt, Aud.

Tyrannula virens, Bp., Woodh.

Myiobius virens, Gray.

Tyrannus virens, Nutt.

Myiarchus virens, Cab., Scl.

Contopus virens, Cab., Scl., Scl. & Salv., Bd., and modern authors.

Pyrocephalus (Contopus) virens, Gray.

Muscicapa guerula, Vieil.

Muscicapa rapax, Wils.

Length, 6.15; wing, 3.50; tail, 3.05.

Hab.—Eastern North America to the borders of the high central plains. Guatemala (?), Mexico, Costa Rica, Texas, Vera Cruz. (B. B. & R.)

A single example was obtained by Mr. Hurdie on April 30, 1852.

Genus EMPIDONAX, Cab.

62. *Empidonax traillii*, (Aud.) Bd. Traill's Flycatcher.

Muscicapa traillii, Aud.

Tyrannula trailli, Rich., Bp., Woodh.

Tyrannus traillii, Nutt.

Myiobius traillii, Gray.

Empidonax traillii, Bd., Cab., Scl., and late writers.

Empidonax pusillus, var. *traillii*, B. B. & R.

Length, nearly 6.00; wing, 2.90; tail, 2.60.

Hab.—Eastern United States and British Provinces, west to the central plains, whence to the Pacific replaced by var. *pusillus*; south to New Granada. (Coues.)

One specimen is in Mr. Bartram's collection, shot at Stocks Point.

Order PICARIÆ.

Sub-order CYPSELLI.

Family CAPRIMULGIDÆ.

Sub-family CAPRIMULGINÆ.

Genus CHORDEILES, Sw.

63. *Chordeiles virginianus*, (Gm.) Bp. Night-Hawk.

Caprimulgus virginianus, Briss. (in part), Gm. Lath., Bp., Aud., Nutt.

Caprimulgus (*Chordeiles*) *virginianus*, Sw. & Rich.

Chordeiles virginianus, Bp., Aud., Gir., Woodh., Cass., Brewer, Newb., Sel., Salv., Coues.

Caprimulgus popetue, Vieil., Bp.

Chordeiles popetue Bd., Heerm., Coop. & Suck., Lawr., Hayd., Allen, Coop., Aiken.

Caprimulgus americanus, Wils.

Length, 9.50 ; wing, 8.20.

Hab.—Entire temperate North and Middle America, north to Hudson's Bay Cuba and Jamaica, migratory ; Bahamas ; south to Brazil. (Coues.)

I cannot do better than quote from "The Naturalist in Bermuda" the following : "These curious birds are sometimes very common in April, and also in September and October, on their migration north and south. The marsh below Government House was their great resort, when, just as it was getting dusk, they would appear one by one, and soon be skimming about in all directions, uttering every now and then a sharp whirring sort of cry. They double and rush about in a most wonderful manner, frequently depressing first one side, then the other. Although flying close together, they seem to try and keep apart, each having seemingly its own hunting ground" (Wedderburn). "When this bird visits the islands of Bermuda from the north, it invariably appears between the 20th of September and the 11th of October, and on its vernal flight from the south, arrives with wonderful precision between the 23d and 30th of April" (Hurdis). Individuals of this species were observed by officers of Prospect Garrison on February 20 and 28, 1875. It would almost seem probable that these wintered in Bermuda ; but the question requires further investigation. They are occasionally picked up dead or in a dying condition. One was found dead in the streets of St. George's on the 26th April, 1875, and a live one was brought to me the same day. The stomachs of several I examined

in October, 1874, contained numbers of the highly-perfumed "green bug," *Rhaphigaster prasinus*, so obnoxious to delicate olfactory nerves. For this good service alone the poor birds should be religiously protected during their short visits.

Family CYPSELIDÆ.

Sub-family CHÆTURINÆ.

Genus CHÆTURA, Steph.

64. *Chætura pelagica*, (Linn.) Bd. Chimney Swift.

Hirundo pelagica, Linn.

Chætura pelagica, B. B. & R.

Hirundo pelasgia, Linn., Vieil., Wils.

Cypselus pelasgius, Bp., Nutt., Aud., De Kay, Maxim.

Chætura pelasgia, Steph., Bp., Aud., Bd., and authors generally.

Acanthylis pelasgia, Temm., Woodh., Brewer.

Length, 5.25; wing, 5.10; tail, 2.15.

Hab.—Eastern United States and British Provinces. (Cones.)

One was shot on the 13th September, 1849. On the 24th of that month Mr. Hurdis noticed several, left behind after the great flight of the Swallow tribe, already alluded to, had taken its departure. Mr. Bartram obtained one in September, 1874, during my residence in the islands, but I did not meet with the species myself.

Family TROCHILIDÆ.

Genus TROCHILUS, Linn.

65. *Trochilus colubris*, Linn. Ruby-throated Humming-bird.

Trochilus colubris, Linn., Lath., Vieil., Wils., Jard., Bp., Sw. & Rich., Nutt., Aud. Gir., and later authors.

Mellisuga colubris, Steph., Gray, Woodh.

Cynanthus colubris, Jard.

Trochilus aureigaster, Lawr.

Length, 3.25; wing, 1.60; tail, 1.25.

Hab.—North America, east of Rocky Mountains, north to 57° at least, south to Brazil; Cuba; winters in Florida (S). (Cones.)

I found the history of this bird's occurrence in Bermuda in a very unsatisfactory state. Colonel Wedderburn writes: "There is a tradition that the Humming Bird visited the islands of Bermuda in considerable numbers about thirty years ago; but of late years they have not been noticed till the 26th April, 1852, when Mr. Hurdis wrote to me, saying that Mr. John Darrell (son of the attorney-general, now chief justice, of those islands) had seen a Humming Bird under the windows of his father's

house, where it was busily employed entering the large white bell-shaped flowers of the giant *Stramonium*, its tail only at times being visible. Another was seen about the same time, and within about 2 miles of the same place, by a Miss Watson, in her brother's garden." Referring to the above, Mr. Hurdis says: "My endeavors to ascertain the truth of the tradition alluded to by Colonel Wedderburn ended in disappointment. The bird seen by Mr. Darrell was described to me as greenish in color, with the tail—the only part visible at times—tipped with white. I need not observe that this characteristic appertains to the female." I was, therefore, much pleased to establish its occurrence beyond a doubt, when going through Mr. Bartram's collection with him. He has a genuine female specimen, shot with powdered rice by himself close to his house, his attention having been called to the diminutive stranger by one of his laborers, who thought it was a large moth. Two others were seen at the same time, but not obtained. How these little birds got to Bermuda is a marvel. They have powerful wings for their size, calculated to keep up that humming vibratory motion necessary for their mode of feeding; but one would think that such a long flight across the sea would induce weariness in so small a frame, and leave them at the mercy of the winds and waves.

Family ALCEDINIDÆ.

Genus CERYLE, Boie.

66. *Ceryle alcyon*, (Linn.) Boie. Belted Kingfisher.

Alcedo alcyon, Linn., Gm., Lath., Vieil., Wils., Bp., Sw. & Rich., Aud., Nutt., Gir., Maxim., Trippe.

Ceryle alcyon, Boie., Bp., Gray, and authors generally.

Ispida alcyon, Sw.

Megaceryle alcyon, Reich.

Chlorosceryle alcyon, Sel.

Alcedo ludoviciana, Gm.

Length of adult, 12.75; wing, 6.00.

Hab.—Over the waters of all North and Middle America and many of the West Indian Islands; resident or imperfectly migratory, being in the north forced away by the freezing of the waters; accidental in Ireland. (Coues.)

"These birds arrive regularly about the middle of September, and are to be found in all the mangrove swamps, creeks, and ponds in the islands. Many remain during the winter, but they all disappear about the middle of April" (Nat. in B., p. 33). I have seen these birds as late as the 26th

April, and at one time thought they must occasionally remain to breed; but after much careful watching, in which I was assisted by my friends, I came to the conclusion that they all depart, sooner or later, to breed on the North American continent. Hungry Bay is a favorite resort of these fine birds. I have seen six or seven there together, chasing one another, darting at the little fish in the pools, and uttering their harsh, rattling cry. They affect the same hunting grounds, especially those birds that remain for the winter, and day after day, as one drives past the creeks and sheltered bays, one sees the same solemn-looking individual on the accustomed rock or cedar-bough, one eye on the fish in the water below, the other on the passers by.

Sub-order CUCULI.

Family CUCULIDÆ.

Sub-family COCCYGINÆ.

Genus COCCYZUS, Bp.

67. *Coccyzus erythrophthalmus*, (Wils.) Bp. Black-billed Cuckoo.

Cuculus erythrophthalmus, Wils., Steph., Hart.

Coccyzus erythrophthalmus, Bp., Aud., Gir., Gray, and later writers.

Piaya erythrophthalma, Less.

Erythrophrys erythrophthalmus, Bp.

Coccygus erythrophthalmus, Cab., Bd., Hayd., Lawr., B. B. & R.

Coccyzus dominicus, Nutt.

Length, about 12.00; wing, 5.00; tail, 6.50.

Hab.—North America to Rocky Mountains; north to Labrador; south through Mexico and Central America to the Valley of the Amazon; Cuba, rarely; no other Antillean record; said to winter in Florida; accidental in Europe. (Cones.)

The first example recorded was shot by Gibbs early in October, 1874, at the same time as a number of the succeeding species, *C. americanus*, from which its smaller bill, less white on the tips of the tail-feathers, and red ring round the eye, at once distinguish it. Mr. Bartram also obtained a specimen that autumn, and I found two others in his collection, labeled *C. americanus*. I saw one near Devonshire Bay on the 19th April, 1875, and one (probably the same) was brought to me on the 30th of that month from Hungry Bay. Lieutenant Hopegood, of the Ninety-seventh Regiment, shot one of a pair in a potato-field near Devonshire Bay on the 8th May, 1875. I imagine this species has occurred more frequently than the records tend to show, not having been distinguished from its larger-billed congener.

68. *Coccyzus americanus*, (Linn.) Bp. Yellow-billed Cuckoo.*Cuculus dominicensis*, Briss. *Cuculus dominicus*, Linn., Lath., Gm.*Coccygus dominicus*, Bd.*Piaya dominica*, Gray.*Cuculus carolinensis*, Briss., Wils.*Erythrophrys carolinensis*, Sw.*Cuculus americanus*, Linn., Gm., Lath., Steph., Hart.*Coccyzus americanus*, Bp., Nutt., Aud., and later authors.*Piaya americana*, Less.*Erythrophrys americanus*, Bp.*Coccygus americanus*, Cab., Bd., Hayd., Coop., Allen, Trippe, B. B. & R.*Coccyzus pyrrhopterus*, Vieil.*Cuculus cinerosus*, Temm.*Coccyzus bairdii*, Sel., Gray.

Length, 12.00; wing, 5.95; tail, 6.35.

Hab.—Eastern United States, to the Missouri plains, California and Nevada, Jamaica, Porto Rico, Costa Rica, Lower Rio Grande. Accidental in Europe, (B. B. & R., Coues.)

A few specimens only are recorded previous to the 9th October, 1849, when an extraordinary invasion took place. Thousands of these birds suddenly appeared in all parts of the islands, most of them departing as suddenly the next day. A few were seen in April, 1852. They were numerous from the 12th to the 15th of October, 1874, and a few remained behind for some time. I shot one near Devonshire Bay, in a potato-field, on the 7th November; its stomach (like that of other specimens examined) was full of green caterpillars collected from the leaves of the potatoes. I was very angry with myself for having killed the poor bird when doing such good service.

Sub-order PICI.

Family PICIDÆ.

Sub-family PICINÆ.

Genus SPHYRAPICUS, Baird.

69. *Sphyrapicus varius*, (Linn.) Bd. Yellow-bellied Woodpecker.*Picus varius*, Linn., Gm., Lath., Vieil., Wils., Bp., Wagl., Nutt., Less., Aud., Gray, Reich., Maxim., Sel., Reinh., Sund.*Picus (Dendrocopos) varius*, Sw. & Rich.*Pilumnus varius*, Bp.*Sphyrapicus varius*, Bd., Malh., Coues, and most late writers.*Sphyropicus varius*, Sel. & Salv., Sel., B. B. & R.*Picus (Sphyrapicus) varius*, Gray.*Picus atrothorax*, Less.

Length, 8.25; wing, 4.75; tail, 3.30.

Hab.—The typical form in Eastern North America, north, to 61° at least south to Guatemala, Mexico, Cuba, Bahamas, Greenland. (Coues.)

Of this species Colonel Wedderburn says: "In general not very common. I first saw it in December, 1847 again in November, 1848; and in April 1850, a great many suddenly appeared, several of which I shot. Many of the palmetto trees are bored by this bird. It breeds in Mr. Ballinghall's garden every year, and I should think that a few also breed in holes in the large trees at Brackish Pond, and in some of the other large swamps." Three examples occurred during my stay, but I could not ascertain whether they bred or not in 1875. I don't think they did so in Brackish Pond, where I kept a careful watch for them. Mr. Bartram has about a dozen specimens, scarcely two of which are alike, so variable is the plumage of the species. They are all in immature dress, with the crimson patches more or less replaced by mottled gray, but all possess the characteristic "yellowness" which distinguishes the bird from nearly all the other American *Picidæ*.

Genus COLAPTES, Sw.

70. *Colaptes auratus*, (Linn.) Sw. Golden-winged Woodpecker; Flicker.

Cuculus auratus, Linn.

Picus auratus. Linn, Forst., Vieil., Wils., Bp., Nutt., Aud.

Colaptes auratus, Sw., Sw. & Rich., Bp., Bd., and most authors.

Geopicus auratus, Malh.

Length, 12.50; wing 6.00.

Hab.—Eastern North America to the slopes and foot-hills of the Rocky Mountains, where in many localities it becomes mixed with *C. mexicanus*; Alaska; Greenland. Accidental in Europe. (Coues.)

The only specimens ever obtained were shot by officers of the Sixty-first Regiment in Devonshire Marsh, as my friend Mr. J. M. Jones informed me. One or two were shot in 1871, I think, but no others are on record.

Order RAPTORES.

Family STRIGIDÆ.

Sub-family STRIGINÆ.

Genus OTUS, Cuv.

71. *Otus vulgaris* var. *wilsonianus*, (Less.) Allen. American Long-eared Owl.

Otus americanus, sp., Kaup., Maxun, Allen.

Strix peregrinator, Bartr.

Asio peregrinator, Strickland.

Strix otus, Wils., Bp., Nutt., Aud. Peal.

Strix (Asio) otus, Sw. & Rich.

Otus wilsonianus, Less., Cass., Brew., Bd., Cooper, Coues, Hayd.

Otus vulgaris, Jard., Aud., Gir.

Otus vulgaris americanus, Schl.

Otus vulgaris var. *wilsonianus*, Allen, Coues, B. B. & R.

Female: Length, about 15.00; wing, 11 to 11½; tail, 6.

Male, rather smaller.

Hab.—Whole of the temperate North America? (B. B. & R.)

This near ally of our European *O. vulgaris* has occurred frequently, but irregularly, during the winter months, generally on the highest part of the islands, near the light-house. One in Mr. Bartram's collection was caught alive at Mount Langton a few years ago. This bird did not, to my knowledge, visit Bermuda during the year 1874-'75.

Genus BRACHYOTUS, Gould.

72. *Brachyotus palustris*, (Bechst.) Gould. Short-eared Owl.

Strix brachyotus, Gm., Lath., Daud., Bechst., Shaw, Temm., Mey., Vieil., Roux, Brewer, Yarr., Penn., Morris, Wils., Bp., Nutt., Aud.

Otus brachyotus, Aud., Jard., Gir., Cass., Reinh., Allen, Boie, Steph., Naum., Eyt., Schl., Gray, Cuv., Less., Sw., Bp., Selby, Mont., Kaup.

Asio brachyotus, Macgil., Strickl.

Ulula brachyotus, Macgil.

Strix accipitrina, Pall., Gm., Daud.

Asio ulula, Less.

Otus ulula, Cuv.

Strix palustris, Bechst., Lath., Shaw, Mey.

Otus palustris, DeKay, Gould, Brehm.

Brachyotus palustris, Bp., Coues, Gould.

Strix brachyura, Nilss.

Strix caspia, Shaw.

Brachyotus galapagoensis, Gould.

Otus galapagoensis, Darw., Bp., Gray.

Asio galapagoensis, Strickl.

Female: Length, about 15 inches; wing, 12; tail, 6.

Male rather smaller.

Hab.—Europe, Asia, Greenland, America, West Indies. (Coues.)

Not so frequent a visitor as the preceding; but, like it, appearing in the autumn and winter months, and usually seen on the south side, near the light-house. The attraction presented by that part of the islands would appear to consist of a plentiful supply of mice, which inhabit the sandy scrub-covered hills near the shore. Mr. Bartram has two specimens of this Owl, and I obtained two myself during my stay—one at the Sand Hills, and another in Warwick Swamp.

Sub-family SYRNINÆ.

Genus SYRNIUM, Sav.

73. *Syrnium nebulosum*, (Forst.) (Boie). Barred Owl.

Strix nebulosa, Forst., Gm., Lath., Daud., Vieil., Wils., Jard., Bp., Sw. & Rich.,
Nutt., Aud., DeKay.

Syrnium nebulosum, Boie, Gray, Gould, Aud., Cass., and later United States
authors.

Ulula nebulosa, Steph., Cuv., Less., Bp., Schl.

Strix chichicli, Gm.

Strix varius, Bart.

Strix fernandica, Shaw.

Length, about 20.00; wing, 13.00 to 14.00; tail, 9.00.

Sexes nearly of the same size.

Hab.—North America, east of the Rocky Mountains, chiefly United States. (Coates.)

Mr. Hurdis observed one of these birds on the 2d April, 1851.

Genus NYCTALE, Brehm.

74. *Nyctale acadica* (Gm.) Bp. Saw-whet Owl.

Strix acadica, Gm., Daud., Vieil., Bp., Sw. & Rich., Jard., Nutt., Aud., DeKay.
Nyctale acadica, Bp., Gray, Kaup, Strickl., Cass., Brewer, Sel., and later
authors.

Nyctala acadica, Gray.

Scotophilus acadicus, Sw.

Noctua acadica, Rich.

Ulula acadica, Aud., Putn., Schl.

Strix acadensis, Lath., Shaw.

Strix albifrons, Shaw., Lath.

Bubo albifrons, Vieil.

Scops albifrons, Steph.

Nyctala albifrons, Cass., Coates, Coop., Verr.

Nyctala albifrons, Gray.

Strix phalaenoides, Daud., Lath., Vieil., Shaw.

Athene wilsoni, Boie.

Total length, $7\frac{1}{2}$ to 8 inches; wing, $5\frac{1}{2}$; tail, $2\frac{3}{4}$ to 3.

Sexes nearly the same size.

Hab.—Temperate North America from Atlantic to Pacific, chiefly, however, northern United States and adjoining British territory ranging southward in woody, mountainous regions into Mexico. Oaxaca. (Coates.)

A rare straggler. Colonel Wedderburn's notes contain all the information we possess. He says (Nat. in B. p. 25): "Only one specimen, found on the 12th January, 1849, sitting inside the muzzle of one of the guns at Ireland Island by an artilleryman. It is to be hoped that the

said gunner has more nerve when working a gun than he displayed on finding the little bird, being afraid to catch it, as, he said, 'it glow'ed at him.' It was caught by a man of the Forty-second, and lived in my room for several days, getting quite tame. At night it always became restless, and finally killed itself against the wires of the cage. Mr. Harry Tucker saw another some short time afterwards, in a cave on the south shore."

Sub-family NYCTEININÆ.

Genus NYCTEA, Steph.

75. *Nyctea scandiaca*, (Linn.) Newton. Snowy Owl.

Strix scandiaca, Linn.

Nyctea scandiaca, Newt., Dress.

Nyctea scandiaca, var *arctica*, Ridg., B. B. & R.

Strix nyctea, Linn., Briss., Brünn., Forst., Gm., Lath., Daud., Vieil., Pall., Wils., Bp., Temm., Nutt., Aud., &c.

Noctua nyctea, Cuv., Boie., Less., Brehm., Schl.

Surnia nyctea, Selby, Gould, Jard., Keys. & Blas., Aud., Gir., Putn., Kaup.

Syrnia nyctea, Macgil., Jard., Watt.

Strix nivea, Thumb., Daud.

Noctua nivea, Brehm.

Nyctea nivea, Gray, Bp., Cass., Brewer, Bd., and many later authors.

Strix bubo, var. *albus*, Daud.

Strix candida, Lath.

Nyctia candida, Sw.

Strix erminea, Shaw.

Total length, 24 to 27 inches; wing, 16 to 17; tail, 10.

Hab.—Northern regions of both continents, migrating southward in winter. Resident in Canada, Bermuda, South Carolina, Kentucky. (Baird.)

Colonel Wedderburn observes (Nat. in B., p. 25): Lieutenant Fayrer, royal navy, shot two specimens at Boss's Cove in the autumn of 1843. Another, a fine female specimen, was shot by a person named Llewellyn, at Ireland Island, on the 29th November, 1853. This bird was only wounded, and when examined by Mr. Hurdis, on the 13th December following, appeared lively and well. When being fed, it frequently erected a little tuft of feathers on each side of the head, so as to resemble small horns. Two frequented the islands in the autumn of 1875; one of these was shot by Lieutenant Tallents, Twentieth Regiment, the other escaped, though it remained two months or more.

Genus *SURNIA*, Duméril.76. *Surnia ulula*, var. *hudsonia*, (Gm.) Coues. American Hawk Owl.*Strix freti hudsonis*, Briss.*Strix hudsonia*, Gm., Wils, Shaw, Vieil.*Surnia hudsonia*, James.*Surnia ulula* var. *hudsonia*, Coues.*Strix canadensis*, Briss., Shaw.*Strix funerea*, Sw. & Rich., Aud., Bp., Brewer, Peab.*Surnia ulula*, Cass., Gray, Lord, Kaup, Dall & Baun., Mayn.

Female: Length, 16 to 17 inches; wing, 9; tail, 7.

Male: Rather smaller.

Hab.—Arctic America, south in winter into Northern United States.

Wisconsin, Massachusetts, Dakota, and Montana. (B. B. & R.)

A single specimen was "seen by Col. Drummond, at St. George's, quite close to him, on a Sunday afternoon, otherwise it would have been shot" (Nat. in B., p. 55).

Family FALCONIDÆ.

Sub-family MILVINÆ.

Genus *CIRCUS*, Lacépède.77. *Circus cyaneus*, var. *hudsonius*, (Linn.) Schl. Marsh Hawk; American Harrier.*Falco hudsonius*, Linn., Gm., Lath., Daud.*Circus hudsonius*, Vieil, Cass., Heerm., Strickl., Coues, Blakist.*Circus cyaneus hudsonius*, Schl.*Circus cyaneus*, var. *hudsonius*, Coues, Gray.*Strigiceps hudsonius*, Bp.*Falco spadiceus*, Gm., Forst.*Falco uliginosus*, Gm., Lath., Daud., Wils., Sab.*Circus uliginosus*, Keil., DeKay, Max.*Strigiceps uliginosus*, Bp. Kaup.*Falco cyaneus*, Aud., Bp.*Circus cyaneus*, Bp., Jard., Sw. & Rich., Aud., Brewer, Nutt., Gir., Gray.

Female: Length, 19 to 21; wing, 15½; tail, 10.

Male: Length, 16 to 18; wing, 14½; tail, 8½ to 9.

Hab.—Entire continent of North America; south to Panama, Cuba, Bahamas. (B. B. & R.)

This species is occasionally seen in Bermuda in the autumn. One was shot by Mr. Pooley, Twentieth Regiment, in 1845, and one by Mr. Hurdis in December, 1851. Mr. Bartram has a male and two female specimens. As might have been expected, he was somewhat unwilling to believe that they were of the same species. A female was picked up dead in Warwick Parish in November, 1874, by a "colored" boy, who showed it to me too late for preservation, unfortunately.

Subfamily ACCIPITRINÆ.

Genus ACCIPITER, Briss.

78. *Accipiter fuscus*, (Gm.) Gray. Sharp-shinned Hawk.*Falco fuscus*, Gm., Lath., Daud., Bp., Nutt., Aud., Brewer.*Accipiter fuscus*, Bp., Cass., Bd., Sel., and most late authors.*Astur fuscus*, Aud., DeKay, Gir.*Nisus fuscus*, Kaup., Finsch., B. B. & R.*Falco dubius*, Gm., Lath., Daud.*Accipiter striatus*, Vieil.*Falco velox*, Wils., Bp.*Accipiter velox*, Vig., Steph.*Falco pennsylvanicus*, Wils.*Nisus pennsylvanicus*, Cuv.*Accipiter pennsylvanicus*, Vig., Steph., Sw. & Rich., Jard., Sw.*Sparvius lineatus*, Vieil.*Accipiter ardosiacus*, Vieil.Female: Length, 12 to 14; wing, $7\frac{1}{2}$ to 8; tail, $6\frac{1}{2}$ to 7.Male: Length, 10 to 11; wing, 6 to $6\frac{1}{2}$; tail, 5 to $5\frac{1}{2}$.*Hab.*—The whole of North America; south to Panama. Bahamas. (B. B. & R.)

Colonel Wedderburn has a specimen in his collection, shot near Peniston's Pond on the 23d February, 1853, and Mr. Bartram has another, shot by himself near Stock's Point.

Genus ASTUR, Lacépède.

79. *Astur atricapillus*, (Wils.) Jard. American Goshawk.*Falco atricapillus*, Wils., Wag, Nutt.*Hierofalco atricapillus*, Cuv.*Sparvius atricapillus*, Vieil.*Astur atricapillus*, Jard. & Selby, Bp., Kaup., Cass., and late authors.*Falco palumbarius*, Bp., Aud.*Accipiter palumbarius*, Sw. & Rich.*Astur palumbarius*, Aud., Gir.*Astur palumbarius*, var. *atricapillus*, Ridg., B. B. & R.*Falco regalis*, Temm.*Dædalion pictum*, Less.Female: Length, 22 to 24; wing, about 14; tail, $10\frac{1}{2}$ to 11.Male: Length about 20; wing, $12\frac{1}{2}$; tail, $9\frac{1}{2}$.*Hab.*—North America, chiefly in the northwestern portions. (Baird.)

I examined two specimens in Mr. Bartram's collection, the only ones that have occurred. One is a fine adult, shot on Somerset Island some twelve years since; the other is in immature plumage, with the close barring of the under parts only just commencing to appear on the thighs.

Sub-family FALCONINÆ.

Genus FALCO, Linn.

80. *Falco communis*, Gm. Peregrine Falcon; Duck-Hawk.*Falco communis*, Gm., Lath., Daud., Savi., Wils., Less., Schl., Bp.*Falco peregrinus*, Ord., Sab., Rich., Bp., James, Woodh., Gir., Gray.*Falco orientalis*, Gm., Lath., Daud.*Falco melanogenys*, Gould, Gray, Bp., Kaup, Strickl.*Falco anatum*, Bp., Gosse, Cass., Brewer, Bd., Cab., Newt., Allen, Coues, Dall & Baun. Coop., and most late American writers.*Falco nigriceps*, Cass., Strickl., Coop. & Suck., Gray, Coop.

Length, 18 to 20 inches; wing, 14 to 15; tail, 7 to 8.

Hab.—Nearly cosmopolitan, var. *communis* from most parts of the Old World, var. *melanogenys* from Australia and Java, var. *anatum* generally distributed in America. (Coues.)

This bird, which Bonaparte separated from the European "*communis*" or "*peregrinus*," under the name "*anatum*," has now been restored, on the authority of Schlegel and other distinguished ornithologists, to its original position. It is a rare visitor to Bermuda. One was killed in 1846 by Dr. Cole, Twentieth Regiment. Another was wounded and taken alive by a colored man on the 1st February, 1850, and presented to Mr. Hurdis, who kept it for several months. A third was also captured, after a revolving gale, at the dockyard. I never saw this grand bird alive while I was quartered in the islands, but I examined a specimen in Mr. Bartram's collection, and another, in the flesh, shot by Lieutenant Tallents, Twentieth Regiment, at Penniston's Pond, on the 10th October, 1874. Mr. Bartram informs me that a pair were shot by a man named Hollis in October, 1875; the male was killed, but the female, being only winged, was kept alive by Mr. Bartram till the end of March, 1877.

81. *Falco columbarius*, Linn. Pigeon Hawk.*Falco columbarius*, Linn., Forst., Gm., Lath., Daud., Cuv., Wils., Jard., Brewer, Bp., Nutt., Less., Sw. & Rich., Sw., Aud., Gir., Coop. & Suck., Coop., Ridg., Allen, Coues.*Falco (Hypotriorchis) columbarius*, of many authors, Cass.*Tinnunculus columbarius*, Vieil.*Nisus columbarius*, Cuv.*Astur columbarius*, Boie.*Hypotriorchis columbarius*, Gray, Bp., Woodh., Cass., Brewer, Heerm., Dress., Coues, Dall & Baun., Lawr.*Æsalon columbarius*, Kaup, Gray.*Falco (Æsalon) lithofalco*, var. *columbarius*, Ridg., B. B. & R.*Falco intermixtus*, Daud., Lath.*Falco temerarius*, Aud., Nutt.

Length: Female, 12 to 14; male, 10 to 11 inches. Wing: female, 8 to 9; male, $7\frac{1}{2}$ to 8. Tail: female, 5 to $5\frac{1}{2}$; male, 5.

Hab.—Temperate North America, Mexico, Central America, Northern South America, Cuba, Jamaica, Bermuda, Ecuador, Venezuela.

A frequent visitor, always in the autumn and winter months. Hardly a year passes without a few stragglers appearing. I saw one flying over Devonshire Swamp on the 2d November, and obtained a beautiful male from the same place on the 3d December, 1874.

Sub-genus TINNUNCULUS, Vieil.

82. *Falco sparverius*, Linn. American Sparrow-Hawk.

Falco sparverius, Linn, Gm., Lath., Daud., Wils., Cuv., Jard., Brewer, Bp., Sw. & Rich., Nutt., Aud., Vieil., and late authors.

Falco (*Tinnunculus*) *sparverius*, of some authors, Ridg., B. B. & R.

Tinnunculus sparverius, Vieil, Gray, Bp., Cass, Coues, and many authors.

Cerchneis sparverius, Boie, Bp.

Pæcilonis sparverius, Kaup.

Length, 11 to 12; wing, 7 to $7\frac{1}{2}$; tail, 5 to $5\frac{1}{2}$.

Hab.—The whole of North America and southward (Coues).

Only one recorded, shot near the Sluice Ponds on the 9th December, 1853, while in the act of pouncing on some chickens (Nat. in B., p. 24).

Sub-family BUTEONINÆ.

Genus BUTEO, Cuv.

83. *Buteo borealis*, (Gm.) Vieil. Eastern Red-tailed Buzzard; Hen-Hawk.

Falco borealis, Gm., Lath., Daud., Wils., Sabine, Bp., Wagl., Nutt., Aud.

Buteo borealis, Vieil, Sw. & Rich., Vig., Less., Jard., Brewer, Bp., Aud., Gosse, Cass., and late authors.

Astur borealis, Cuv., Sw.

Pæcilopternis borealis, Kaup.

Buteo (*Crazirex*) *borealis*, Gray.

Falco leverianus, Gm., Lath, Daud., Shaw, Wils.

Falco jamaicensis, Gm.

Buteo ferrugineicaudus, Vieil, Cuv.

Accipiter ruficaudus, Vieil.

Buteo fulvus, Vieil.

Buteo americanus, Vieil.

Female: Length, 22 to 24; wing, 15 to 16; tail, $8\frac{1}{2}$. Male: Length, 19 to 21; wing, 14; tail, $7\frac{1}{2}$ to 8.

Hab.—Whole of North America, Mexico, Cuba, Jamaica (Coues).

Mr. Bartram has one specimen, an adult, with fine chestnut tail, shot at Baylis's Bay, about twelve years ago, by a man named Hollis, who is still residing in the islands, the same who shot the two Peregrine

Falcons alluded to in the notes on that species. About the same time a nest of this buzzard containing young is said to have been found in the cliffs of Harrington Sound, but what became of this nest and its occupants history saith not. I see no reason to doubt the story, especially as it is corroborated by an authentic specimen of the bird; but I unfortunately did not see the man Hollis, as I meant to have done. Large hawks are mentioned as common in Bermuda by the old historians, and this species may have once been resident and numerous. The high cliffs on the north side of Harrington Sound offer great attractions to raptorial birds, in default of large timber, for nesting, and this species is known to breed in Jamaica (Gosse, B. of Jamaica, p. 14).

Genus ARCHIBUTEO, Brehm.

84. *Archibuteo lagopus*, var. *sancti-johannis*, (Gm.) Ridg. American Rough-legged Buzzard.

Falco Sancti-Johannis, Penn., Gm., Lath., Daud., Shaw, Bp., Aud., Gir.

Butes Sancti-Johannis, Jard., Nutt., De Kay.

Butaëtes Sancti-Johannis, Cuv., Bp.

Archibuteo Sancti-Johannis, Gray, Bp., Cass., Kaup., Strickl., Brewer.

Falco spadiceus, Gm., Latti, Daud.

Butes spadiceus, Vieil.

Falco lagopus, Wils., Brewer, Bp., Aud.

Buteo lagopus, Rich., Aud., Jard., Nutt.

Archibuteo lagopus, Cass., Brewer, Coop. & Luck., Coues.

Falco niger, Wils., Lath.

Buteo niger, Steph., Vig., Cuv.

Buteo ater, Vieil.

Female: Length, 22 to 24; wing, 17 to 17½; tail, 9.

Male: Length, 20 to 22; wing, 16 to 16½; tail, 8 to 8½.

Hab.—Typical *lagopus*, European. Var. *Sancti-Johannis*, in North America at large, rather northerly; the melanotic condition chiefly observed in the Middle Atlantic States, New England. and northward (Coues).

A dingy old specimen in Mr. Bartram's possession, covered with dust and cobwebs, and with all the quills and tail-feathers nibbled off short by rats, appears to belong here. Its measurements and fully-feathered tarsi are, I think, unmistakable. The bird was originally dubbed an "Eagle." It was shot near Prospect Camp by a medical gentleman, who gave it to Mr. Bartram.

Sub-family AQUILINÆ.

Genus PANDION, Savigny.

85. *Pandion haliaëtus*, (Linn.) Cuv. Osprey.*Aquila haliaëtus*, Briss., Mey., Jen.*Falco haliaëtus*, Linn., Gm., Lath., Daud., Shaw, Temm., Wils., Bp., Nutt., Aud., Gir., Naum.*Accipiter haliaëtus*, Pall.*Pandion haliaëtus*, Cuv., Less., Steph., Sw., Kaup, Eyton, Bp., Keys & Blas., Schl., Gray, Strickl., Coues, and of authors.*Falco arundinaceus, cayanensis, carolinensis*, Gm., Daud.*Pandion carolinensis*, Bp., De Kay, Strickl., Cass., Brewer, Heerm., Coop. & Suck., Lord, Coues, Dall & Bann., Coop., and most late U. S. authors.*Pandion haliaëtus*, var. *carolinensis*, Ridg., B. B. & R.*Pandion fluvialis*, Savi., Less., Vieil., Degl., Roux, Baill., Puch.*Pandion americanus*, Vieil., Sw., Vig.*Pandion indicus*, Hodges.*Pandion leucocephalus*, Gould, Gray, Bp., Strickl.*Pandion haliaëtus*, var. *leucocephalus*, Ridg., B. B. & R.

Female: Length about 25 inches; wing, 21; tail, 10½.

Male rather smaller.

Hab.—Cosmopolitan. American and Australian, respectively, under the names of *P. carolinensis* and *P. leucocephalus*, have been currently regarded as distinct races or species (Coues).

The movements of this cosmopolitan species in Bermuda are somewhat mysterious. In 1874 I saw the first on April 22; in 1875, one was observed on the 17th of that month. During May they are often to be seen, especially about the Great Sound, along the south shore, and at Peniston's Pond, but whether these are old or young birds I cannot say, as I religiously abstained from shooting one. During the summer months I lost sight of them, though I believe they were occasionally observed, but in autumn I met with one or two specimens. On May 2, 1875, I watched for some time two of these fine birds circling over Devonshire Swamp. This gave rise to the question, "Do they breed here?" I took eggs in Southern Spain, slightly incubated, on March 29; and there being but little difference of latitude between the two places, it would be only natural to suppose that if they were going to nest in Bermuda they would have arrived earlier. Probably, therefore, they are young birds from early nests on the mainland. They are said by Newton to be found on the island of St. Croix at all times except during the breeding season, and the same remark doubtless applies to Bermuda. I could hear nothing of nests in former years. I must leave the question to be solved by future visitors to the islands.

Genus HALIAËTUS, Savigny.

86. *Haliaeetus leucocephalus*, (Linn.) Sav. White-headed Eagle; Bald Eagle.

Aquila leucocephalus, Briss., Vieil., Pall., Sw.

Falco leucocephalus, Linn., Gm., Lath., Shaw, Wils., Bp., Nutt., Aud., Brewer.

Haliaëtus leucocephalus, Savig., Cuv., Less., Steph., Bp., Aud., Gir., Gray, Cass., Brewer, and of authors generally.

Aquila (haliaëtus) leucocephalus, Sw. & Rich.

Falco pygargus, Daud.

Falco ossifragus, Wils.

Falco washingtonii, Aud., Nutt., Brewer, James.

Haliaëtus washingtonii, Bp., Aud., Cass.

Female: Length, 35 to 40; wing, 23 to 25; tail, 14 to 15.

Male: Length, 30 to 34; wing, 20 to 22; tail, 13 to 14.

Hab.—The whole of North America; Greenland (Coues).

This fine bird was seen by Mr. Hurdis, in Hamilton Harbor, on the 8th June, 1853, and an undoubted adult example was frequently observed in Pembroke Marsh and other places between the 2d and 11th March, 1854. Mr. Bartram informs me that he came upon one perched on an old turret of the Castle, at the entrance of Castle Harbor, on the 1st May, 1877. He at first thought it was an osprey, but soon noticed the white head and neck of the Eagle. He had no gun with him at the time. Again, on the 10th October, 1878, he was told of a strange bird on a tree near his house, and on proceeding to the spot "it flew past me quite low, and slow, not more than twenty or thirty yards from me, and I was so much occupied in taking stock of it that I never once thought of pulling the trigger until it was out of reach. Its head and neck were clear white; all the other parts dark-brown." In a subsequent paragraph of his letter he adds: "I have just (14th October, 1878) got word that one of my gunners was after the Eagle on Long-bird Island this afternoon, but a carriage came along and scared it away. I hope that some of us will get a chance yet." As I have not since heard from Mr. Bartram, I am unable to state anything definite regarding the capture of the bold stranger, and the White-headed Eagle must still be included in the Bermuda lists as "seen but not obtained." Nevertheless, the evidence is so very strong and clear that I have not hesitated to give a place to the species in this work.

Mr. Bartram writes, under date 9th December, 1878, that this fortunate bird made good his escape after all. (S. G. R.)

Family CATHARTIDÆ.

Genus CATHARTES, Ill.

87. *Cathartes aura*, (Linn.) Ill. Turkey-buzzard.

Vultur aura, Linn., Gm., Lath., Bartr., Vieil., Wils., Licht., Aud., Darwin, Wagl.

Cathartes aura, Ill., Cuv., Vig., Less., Bp., Jard., Sw. & Rich., Nutt., Sw., Aud., d'Orbig., and authors generally.

Catharista aura, Viel., Gray.

Percnopterus aura, Steph.

Rhinogryphus aura, Ridg., B. B. & R.

Vultur aura β , Lath.

Vultur iota, Molina, Gm., Daud.

Cathartes iota, Auct.

Length, 30; wing, 23; tail, 12.

Hab.—All of North America, except the Arctic Regions (Baird).

A male of this ill-favored species appeared during the yellow-fever epidemic of 1853. Was its coming accidental, or did some marvelous instinct lead it there? It was shot in the latter part of November, and subsequently examined by Mr. Hurdis.

Order COLUMBÆ.

Family COLUMBIDÆ.

Sub-family COLUMBINÆ.

Genus ECTOPISTES, Sw.

88. *Ectopistes migratoria*, (Linn.) Sw. Passenger Pigeon.

Columba canadensis, Linn., Gm.

Columba migratoria, Linn., Gm., Forst., Wils., Bp., Nutt., Aud.

Ectopistes migratoria, Sw., Bp., Reich., Aud., and late writers.

Peristera migratoria, Schl.

Length, 17; wing, 8.50; tail, 8.40.

Hab.—The greater part of North America, but scarcely west of Rocky Mountains; Cuba; accidental in Europe (Coues).

Colonel Wedderburn records that one was seen by Dr. Cole; but no date is given. Mr. Bartram shot one as he lay on a sofa in his museum with "broken-bone" fever, on October 24, 1863; it was sitting on a tree close to his house. My friend Mr. J. M. Jones was informed by Mr. J. H. Trott that, previous to 1831, small parties of these birds were resident in the islands, breeding in the caves at Walsingham, and along

the south shore; but I am inclined to think, with all deference to the authority given, that these must have been escaped "Blue Rocks" from dove-cotes in the islands.

Subfamily ZENAIDINÆ.

Genus ZENAIDURA, Bp.

89. *Zenaidura carolinensis*, (Linn.) Bp. Carolina Dove.

Columba carolinensis, Linn., Gm., Lath., Wils., Bp., Nutt., Aud.

Ectopistes carolinensis, Rich., Bp., Aud., Heerm.

Zenaidura carolinensis, Bp., Bd., Sel., Coop. & Luck., Hayd., Cones, Dress,
Allen, Lawr., Coop.

Perissura carolinensis, Cab.

Peristera carolinensis, Schl.

Columba marginata, Linn., Gm., Wag.

Ectopistes marginata, Gray.

Zenaidura marginellus, Bp.

Length, 12.85; wing, 5.75; tail, 6.70.

Hab.—United States, from Atlantic to Pacific; Canada West; Cuba; south to Panama (Coues).

Specimens are recorded in *The Naturalist in Bermuda*. One was shot by Captain Harvey on March 20, 1850, and another was taken alive at Spanish Point on October 30, 1854. I saw one at the Sand Hills on November 5, 1874. A small flock frequented the fields near Whale Bay all through the winter of 1874-'5, and specimens were obtained, one by Lieutenant Hussey, Royal Engineer, on February 11, 1875. I hear from Lieutenant Denison that two were seen as late as June 20, 1875. Can they have remained to breed? These pretty birds are fond of associating with the next species, feeding with them on the newly-turned fields, conspicuous, when the flock is disturbed, by their larger size and long tails. Their flight is very strong and rapid.

Genus CHAMÆPELIA, Sw.

90. *Chamæpelina passerina*, (Linn.) Sw. Ground Dove.

Columba passerina, Linn., Lath., Wils., Wag., Aud., Lund.

Columba (Goura) passerina, Bp., Nutt.

Chamæpelina passerina, Sw.

Chamæpelina passerina, Bp., Gosse, Bd., Sel., Cab., Lawr., Coop.

Chamæpelina granatina, Bp.

Chamæpelina albivita, Bp.

Length, 6.30; wing, 3.50; tail, 2.80.

Hab.—South Atlantic and Gulf coasts; accidental near Washington; Lower California, West Indies, New Granada, Venezuela, Bermuda (Baird).

Resident and abundant. It nests twice, laying two white eggs, .85 inch by .64 inch, in a small, flimsy construction of twigs and cedar bark, generally placed on the bushy horizontal bough of a cedar tree, from eight feet to twenty feet above the ground. The earliest eggs I saw were on April 4, the latest on June 27; but there are instances of its breeding even in the winter months. When disturbed from its nest it falls like a stone to the ground, where it commences to flutter about, as if in the agonies of death, to deceive the intruder. Should the latter be taken in by the good acting of the poor little bird, and attempt to seize her, she shuffles away along the ground just out of reach, farther and farther from her nest, and when she thinks her home is safe, away she dashes into the trees with a joyful "whir-r-r-r" of relief. My terrier used to be completely "sold" in this way, and had many an exciting but fruitless chase after the little doves. The "colored" people have an absurd superstition about this bird, and say that when it utters its "coo-oo" (this is an extraordinarily loud and sonorous call for so small a bird, and can be heard a long distance), it is scratching up the ground for somebody's grave! The habits and mode of feeding of the species are too well known to need description. The male is larger, and has the sides of the neck and the under parts of a much warmer purplish red than the female.

Order GALLINÆ.

Family PERDICIDÆ.

Sub-family ORTYGINÆ.

Genus ORTYX, Steph.

91. *Ortyx virginianus*, (Linn.) Bp. Virginian Partridge or Quail.

Tetrao virginianus, Linn., Gm.

Perdix virginiana, Lath., Wils., Bp., Aud.

Ortyx virginianus, Jard., Bp., Aud., Gould, Bd., and late authors.

Tetrao marilandicus, Linn., Gm.

Perdix marilandica, Lath.

Perdix borealis, Vieil.

Ortyx borealis, Steph., Jard., & Selby.

Ortyx castaneus, Gould.

Length, 10.00; wing, 4.70; tail, 2.85.

Hab.—Eastern United States to the high central plains (Baird).

This bird (known to English sportsmen as a comparatively recent introduction, under the name of Virginian "Colin") is *the* gamebird of Bermuda; but whether it originally found its way there from the Amer-

ican continent without the agency of man is doubtful. It is not mentioned by the old historians. It is certain, however, that, though common some few years previous to 1840, it became extinct in the islands from that year till 1858 or 1859, when, thanks to the enterprise of Mr. Richard Darrell, an importation took place from the United States. Several pairs were turned out, and these, increasing rapidly, soon spread over the islands to such an extent that the species may now once more be considered common. The manners and customs of this handsome bird are too well known for me to venture on details. From my notes, however, I extract the following, which may prove of interest: It is extremely prolific. Mr. Samuel Harvey told me of a nest near his garden containing eighteen eggs, every one of which hatched off; there are seldom less than twelve eggs in a nest; they sit in the cedar trees on wet days, and during the mid-day heat, roosting there at night. When once flushed they are very hard to put up a second time, even with good dogs, being able, according to popular superstition, to conceal their scent at will; they run rapidly, and squat closely in the thick sage-bush, the strong smell of which is calculated to puzzle a dog. Their call note is triple, "hoo-woo-wooit," the "hoo" indistinct and audible for a short distance only. I don't think "Bob White," the familiar American name, fairly represents the call; it is too sharp and well defined. These birds are fond of the ripe berries of the sage and cedar; the latter give the flesh a decidedly unpleasant aromatic flavor. They also eat the sweet potatoes in small pieces. Great numbers of the young are destroyed by the swarm of cats which infest the islands. An old "colored" lady once accosted a gallant officer of the Fifty-third Regiment, who was beating some likely ground near her cottage, and asked him what he was looking for. "Partridges!" cried she, with a sneer on her sable features, "I don't want a gun to get them. Why! my cat brings me in one every morning!" Cats, however, are not the only foes to be dreaded. The "colored" sportsmen take the eggs and eat them, while a white "sportsman" resident on the islands was once overheard to say, "It's all very well for the officers; they get lots of practice—can shoot Partridges at any time—but the only time I can get them is when they have nests, and I can kill the old birds." No wonder the poor birds are kept down, and increase with lamentable slowness. If it were not that they are so hard to put up and shoot in a workmanlike manner (two brace being quite a "bag" in one day), their extermination would be a matter of a few years only.

Order GRALLATORES. .

Sub-order LIMICOLÆ.

Family CHARADRIIDÆ.

Sub-family CHARADRIINÆ.

Genus SQUATAROLA, Cuv.

92. *Squatarola helvetica*, (Linn.) Brehm. Black-bellied Plover; Gray Plover.*Tringa helvetica*, Linn., Forst.*Squatarola helvetica*, Brehm., Bp., Gray, and of most late authors.*Vanellus helveticus*, Vieil.*Charadrius helveticus*, Licht., Bp., Nutt., Aud.*Tringa varia*, Linn.*Charadrius varius*, Finsch & Hartl.*Pluvialis varius*, Schl., Degl. & Gerbe.*Tringa squatarola*, Linn.*Charadrius squatarola*, Naum.*Vanellus squatarola*, Schl.*Vanellus melanogaster*, Bech., Temm., Sab., Rich., Sw. & Rich.*Squatarola australis*, Bp.

Length, 11.50; wing, 7.50; tail, 3.00.

Hab.—Nearly cosmopolitan.

Unlike the next species, this is by no means a frequent visitor to the Bermudas. One was killed and another seen by Colonel Wedderburn at Mangrove Bay in September, 1848. I shot one on the beach below the Sand-hills on the 5th, and another near Warwick Camp on the 13th November, 1874. Both these birds were alone.

Genus CHARADRIUS, Linn.

93. *Charadrius fulvus*, var. *virginicus*, (Bork.) Coues. American Golden Plover.*Charadrius dominicus*, Müller, Cass.*Charadrius pluvialis*, Wils., Sab., Bp., Sw. & Rich., Nutt., Aud.*Charadrius pluvialis*, var. *virginicus*, Ridg.*Charadrius virginicus*, Bork., Licht., Bd., Coop. & Luck., Hayd., Dress., Reinh., Stev., Snow, Trippe, and of nearly all late local lists.*Pluvialis virginicus*, Bp.*Charadrius marmoratus*, Wag., Aud., Putn.*Pluvialis fulvus americanus*, Schl.*Charadrius fulvus*, var. *virginicus*, Coues.

Length, 9.50; wing, 7.00; tail, 2.50.

Hab.—All of North America; Greenland; accidental in Europe. (Coues.)

Dr. Coues is of opinion that the American bird cannot be specifically separated from the Asiatic *C. fulvus* (an undoubted specimen of which has been recently obtained in the Prybilov Islands). It can always be distinguished from our European *C. pluvialis* by its gray axillaries. An excellent account of the appearances of this species in Bermuda is given by Mr. Hurdiss (Nat. in B., pp. 71-77), who goes carefully and thoroughly into the question of its wonderful migrations. Colonel Wedderburn says (p. 36): "During some years large flocks of these birds pass over the islands in the months of September and October; but, unless in stormy weather, they do not alight in any great numbers. I have seen it as early as the 21st August, 1847, at Ireland Island; again, on the 25th July, 1848, at Hamilton. The latter was a single bird sitting on the road close to the house in which I lived, but by the time I got out it was gone. On the 9th March, 1852, one was shot in beautiful plumage, on the north shore; and this is the only instance of its appearing in spring." Numbers appeared in September, 1874, frequenting the grassy slopes of the north shore—their favorite haunt—and even the parade grounds, during the continuance of a three days' revolving gale. Many were shot, all in the mottled dress which procured for the species the specific name "*marmoratus*." Small flocks continued to arrive at intervals during the autumn, remaining only a few days in each case. I obtained specimens on the 14th and 23d November in complete winter dress. The arrival of the Golden Plover in August or September is the beginning of the shooting season in Bermuda, and is eagerly looked for by the British officer, who forgets all the heat and discomfort of the summer in the pleasure of once again handling his gun and cartridges. And a nicely-cooked Golden Plover for breakfast is by no means to be despised, as those who have been trifling with tough fowls and doubtful eggs for months can well testify. The note of this species differs from that of *C. pluvialis*; it sounds like "wee-o-wee," sharply but clearly pronounced.

Genus *ÆGIALITIS*, Boie.

94. *Ægialitis vociferus*, (Linn.) Bp. Kildeer Plover.

Charadrius vociferus, Linn., Gm., Lath., Wils., Bp., Sw. & Rich., Nutt., Aud. Schl., and of earlier authors generally.

Ægialitis vociferus, Bp., Cab., Sel., Coop. & Suck., Dress., Lawr., and of most later writers.

Oxyechus vociferus, Reich.

Charadrius torquatus, Linn.

Charadrius jamaicensis, Gm.

Length, about 9.50; wing, 6.50; tail, 3.50.

Hab.—All of temperate North America; West Indies; Central and South America in winter; accidental in Europe. (Coues.)

The latest of the southward migrants, but regular in its visits. First seen about the middle of November, in small flocks, which remain till February, attaching themselves principally to the grassy bottoms and moist places on the south side. Persons living on this side hear their sweet wild note all night. A few remain till March or even later.

95. *Ægialitis semipalmatus*, (Bp.) Cab. Semipalmated or Ring Plover.

Tringa hiaticula, Wils.

Charadrius hiaticula, Ord., Sab., Rich.

Charadrius (Ægialitis) hiaticula var. *semipalmatus*, Ridg.

Charadrius semipalmatus, Bp., Kaup., Wagl., Sw. & Rich., Nutt., Aud., Schl., Gray.

Ægialitis semipalmatus, Bp., Cab., Bd., Coop. & Suck., Coues, Dress., Dall & Bann., Mayn., Allen.

Ægialeus semipalmatus, Reich., Allen.

Length, about 7.00; wing, 4.75; tail, 2.25.

Hab.—Continent of North America, breeding chiefly in higher latitudes, wintering from our southern border to Brazil. (Coues.)

Arrives in small numbers early in August, with the annual invading army of Stints and Sandpipers, remaining till October, and frequenting the sandy bays on the south shore, also the muddy edges of Peniston's Pond.

96. *Ægialitis melodus*, (Ord.) Bp. Piping Plover.

Charadrius hiaticula, Var., Wils.

Charadrius melodus, Ord., Bp., Nutt., Aud., Schl., Gray, Finsch.

Charadrius (Ægialitis) melodus, Ridg.

Ægialitis melodus, Bp., Cab., Bd., Bryant, Sel., and late authors.

Ægialeus melodus, Allen.

Charadrius okeni, Wagl.

Length, about 7.00; wing, 4½; tail, 2.

Hab.—Eastern coast of North America, Cuba, Bahama, Jamaica. (Coues.)

Rare. Colonel Wedderburn shot one at Mangrove Bay in September, 1848, and two were seen on a rocky island in Hamilton Harbor in September, 1850. Mr. Bartram has one specimen. Not observed in 1874.

Family HÆMATOPODIDÆ.

Genus STREPSILAS, Ill.

97. *Strepsilas interpres*, (Linn.) Ill. Turnstone.

Tringa interpres, Linn., Gm., Lath., Wils.

Strepsilas interpres, Ill., Leach, Steph., Bp., Sw. & Rich., Nutt., Eyt., Keys. & Blas., Schl., Aud., and authors generally.

Cinclus interpres, Gray.

Tringa morinella, Linn., Gm.

Streptilas collaris, Temm., Brehm., Sab., Rich.

Charadrius cinclus, Pall.

Length, 9; wing, 6; tail, $2\frac{1}{2}$.

Hab.—Sea-coast of nearly all countries, less frequent in the interior. (Coues.)

This cosmopolitan species is a frequent visitor. It has been shot as early as the 3d August. I obtained two on the 23d December, 1874, but it probably remains all the winter.

Family RECURVIROSTRIDÆ.

Genus HIMANTOPUS, Briss.

98. *Himantopus nigricollis*, Vieil. Black-necked Stilt.

Charadrius mexicanus, Müller, Cass.

Himantopus mexicanus, Ord., Max., Wagl., Bp.

Charadrius himantopus, Lath.

Recurvirostra himantopus, Wils.

Himantopus nigricollis, Vieil., Bp., Nutt., Aud., and most authors.

Hypsibates nigricollis, Cab.

Length, 14; wing, $8\frac{1}{2}$ to 9; tail, 3.

Hab.—From United States generally, Mexico, part of West Indies, Central America, and South America to Peru and Brazil. (Coues.)

The American representative of our *H. melanopterus*. Only one has occurred, shot at Warwick Pond on the 3d June, 1853, by Mr. Hinson, and sent to Mr. Hurd.

Family PHALAROPODIDÆ.

Genus LOBIPES, Cuv.

99. *Lobipes hyperboreus*, (Linn.) Cuv. Northern Phalarope.

Tringa hyperborea, Linn., Brünn., Fabr., Gm.

Phalaropus hyperboreus, Lath., Temm., Sab., Bp., Nutt., Aud., Bd., Salv., Coop. & Suck., Lawr., Allen, Schl.

Lobipes hyperboreus, Cuv., Steph., Brehm, Jen., Eyt., Bp., Aud., Gir., Coues, Dall. & Bann., Ridg.

Tringa lobata, Linn.

Tringa fusca, Gm.,

Phalaropus fuscus, Lath.

Phalaropus ruficollis, Pall.

Phalaropus cinerascens, Pall.

Phalaropus cinereus, Mey. & Wolf., Keys. & Blas., Schl., Finsch.

Length, about 7; wing, $4\frac{1}{2}$; tail, $2\frac{1}{4}$.

Hab.—Northern hemisphere, penetrating to very high latitudes to breed; migratory sometimes into the tropics in winter. (Coues.)

One found dead, floating in Riddle's Bay, March 21, 1848, sent to Rev. H. B. Tristram. A female, partly in ruddy plumage, killed with a stick in Hamilton Harbor on the following day, and a third example captured on the edge of Devonshire Swamp by Mr. Hurdis on the 8th March, 1852. "It is remarkable that all the specimens were obtained without the aid of a gun" (Hurdis).

Family SCOLOPACIDÆ.

Sub-family SCOLOPACINÆ.

Genus PHILOHELA, G. R. Gray.

100. *Philohela minor*, (Gm.) Gray. American Woodcock.

Scolopax minor, Gm., Lath., Wils., Bp., Aud.

Rusticola minor, Vieil., Bp.

Rusticola (Microptera) minor, Nutt.

Philohela minor, Gray, Bd., and of most late authors.

Microptera americana, Aud., Gir.

Length, about 11; wing, $5\frac{1}{4}$; tail, $2\frac{1}{4}$.

Hab.—Eastern United States and British Provinces, north to Nova Scotia and Canada, northwest to Fort Rice, Dakota; west to Kansas and Nebraska. (Coues.)

"A single specimen was shot near Hamilton in October, 1842, and one was supposed to have been seen at Hungry Bay a few years afterwards by Mr. Fozard" (Nat. in B., p. 42).

Genus GALLINAGO, Leach.

101. *Gallinago wilsonii*, (Temm.) Bp. American or Wilson's Snipe.

Scolopax gallinago, Wils.

Scolopax wilsonii, Temm., Bp., Sw. & Rich., Nutt., Aud., Gir., Trippe, and of many earlier authors.

Gallinago wilsonii, Bp., Sel., Bd., Salv., and later authors.

Gallinago gallinaria var. *wilsoni*, Ridg.

Gallinago brehmii, Bp.

Scolopax delicatula, Ord.

Scolopax drummondii, Sw. & Rich., Nutt., Aud.

Gallinago drummondii, Bp.

Scolopax douglasii, Sw. & Rich., Nutt.

Length, about $10\frac{1}{2}$; wing, 5; tail, $2\frac{1}{4}$.

Hab.—The whole of North America, southward to South America; Mexico; West Indies. (Coues) Bermuda.

Usually makes its first appearance at the beginning of October, a straggler or two remaining till January, and occurs also in March, April, and May in limited numbers on its northward journey. It has been seen as early as the 13th September (Hurdis). It seems rather a

farce to talk of the snipe-shooting in Bermuda; but occasionally large flights come in, and really fair bags are made, such as six or nine couple a-day to two guns. Pembroke Marsh is the great place for them, and a few usually take up their quarters in Devonshire Swamp. They are very good eating at first, but soon become rank from feeding in the brackish mud. They lie closer than our European snipe, and a dog is a *sine quâ non* in the thick scrub-grown marshes. Their note is very similar, but they differ somewhat in plumage, especially in having sixteen tail-feathers instead of fourteen like our bird.

102. *Gallinago media*, Leach. European Snipe; Common Snipe.

Scolopax gallinago, Linn., Gm., Briss.

Gallinago media, Leach.

Gallinago scolopacina, Bp., Naum., Gould.

Gallinago uniclavata, Hodgs.

Gallinago brehmi, Kaup, Jard.

Gallinago delamotti, Bail.

Gallinago sabini, Vig., Gould.

We have Colonel Wedderburn's authority for the occurrence of this bird in Bermuda. He says (Nat. in B., p. 43): "I shot one of this species on the 24th December, 1847. It precisely answered to the description of the *S. gallinago* and had but fourteen tail-feathers. I shot another specimen also with fourteen tail-feathers on the 29th December, 1847. Both these birds I got in Pembroke Marsh, and there cannot be the least doubt about the bird and the propriety of adding it to the Bermuda list."

Genus MACRORHAMPHUS, Leach.

103. *Macrorhamphus griseus*, (Gm.) Leach. Red-breasted Snipe; Grey Snipe.

Scolopax grisea, Gm., Lath., Temm., Flem., Jen., Schl.

Scolopax (Macrorhamphus) grisea, Bp., Nutt.

Macrorhamphus griseus, Leach, Steph., Eyt., Keys. & Blas., Gray, Bp., Bd., Coop. & Suck., Salv., and late authors.

Limosa grisea, Schl.

Scolopax noveboracensis, Gm., Lath., Wils., Sw. & Rich., Aud., Gir.

Totanus noveboracensis, Sabine.

Macrorhamphus scolopaceus, Lawr., Bd., Elliot, Cones, Dall & Bann.

Length, 10; wing, $5\frac{3}{4}$; tail, $2\frac{1}{4}$.

Hab.—The whole of North America, Greenland, Mexico, West Indies, Central America. Much of South America, Brazil, Chili. Of frequent casual occurrence in Europe. (Coues.)

One "shot by Captain Orde on the 29th September, 1847, at Harris's Bay; another was killed by Mr. C. Fozard on the 21st August, 1848"

(Nat. in B., p. 43). A third was obtained on Pearl Island on September 10, 1874, by Captain Kirkwood, Fifty-third Regiment. This specimen was preserved by Captain Rooke, who kindly presented it to me. Three were shot at Peniston's Pond on the 17th September, 1875, by Lieutenant Festing, Twentieth Regiment, and examined by Lieutenant Denison, Royal Engineers.

Genus MICROPALAMA, Bd.

104. *Micropalama himantopus*, (Bp.) Bd. Stilt Sandpiper.

Tringa himantopus, Bp., Less., Sw. & Rich., Aud., Gir., Schl.

Tringa (Hemipalama) himantopus, Bp., Nutt.

Hemipalama himantopus, Bp., DeKay.

Micropalama himantopus, Bd., Salv., Coues, Lawr., Sel., Dress., Sel. & Salv., Allen, and later authors.

Ereunetes himantopus, Sund.

Micropalama himantopus, Gray.

Hemipalama multistriata, Gray, Pelz.

Tringa (Hemipalama) auduboni, Nutt.

Length, $8\frac{1}{2}$ to 9; wing, $5\frac{1}{4}$; tail, $2\frac{1}{4}$; tarsus, $1\frac{3}{4}$.

Hab.—North America generally; not observed west of Rocky Mountains; rare in the United States. West Indies; Central America; most of South America. (Coues.)

Colonel Wedderburn killed two, one of which he unfortunately lost, in the beginning of August, 1848. Lieutenant Denison, Royal Engineers, records another, shot by Lieutenant Festing, Twentieth Regiment, at Peniston's Pond, early in September, 1875.

Genus EREUNETES, Illiger.

105. *Ereunetes pusillus*, (Linn.) Cass. Semipalmated Sandpiper.

Tringa pusilla, Linn., Gm., Lath., Schl.

Ereunetes pusillus, Cass., Coues, and most late U. S. authors.

Ereunetes petrificatus, Ill., Cass., Hayd., Trippe, Snow.

Tringa semipalmata, Wils., Vieil., Sw. & Rich., Aud., Gir., Newb.

Tringa (Hemipalama) semipalmata, Bp.

Tringa (Heteropoda) semipalmata, Nutt.

Heteropoda semipalmata, Bp., DeKay, Gray.

Ereunetes semipalmata, Cab., Bp.

Pelidna brissoni, Less.

Heteropoda mauri, Bp., Gundl.

Hemipalama minor, Lemb.

Ereunetes occidentalis, Lawr.

Length, $6\frac{1}{2}$; wing, $3\frac{3}{4}$; tail, $1\frac{3}{4}$.

Hab.—The whole of North, Central, and most of South America. (Coues.)

A regular visitor, arriving about the 1st August, or a few days earlier, and found in small flocks in the sandy bays, and on the margins of the open brackish ponds throughout the islands. They do not remain long.

Genus TRINGA, Linn.

106. *Tringa minutilla*, Vieil. Least Sandpiper; American Stint.*Tringa minutilla*, Vieil., Gray, Sh. & Dress., Coues, Finsch.*Actodromus minutilla*, Bp.*Actodromas minutilla*, Coues, Dress., Lawr., Allen, Verr., Newton, Dall & Bann., Mayn., Ridg.*Tringa pusilla*, Wils., Ord., Brewer, Bp., Sw. & Rich., Aud., Gir.*Pelidna pusilla*, Bp., Gosse.*Tringa wilsoni*, Nutt., Bd., Coop. & Suck., Cass., Trippe.*Actodromus wilsoni*, Bp.*Tringa nana*, Licht.Length, $5\frac{1}{2}$ to 6; wing, $3\frac{1}{2}$ to $3\frac{3}{4}$; tail, $1\frac{3}{4}$.*Hab.*—North, Central, and South America and West Indies; accidental in Europe. (Coues.)

Arrives about the same time, and frequents the same localities, as the preceding species. I shot one as late as the 23d December, probably a straggler left behind. I also obtained a solitary example on its northward flight on the 29th April, 1875, at Peniston's Pond.

107. *Tringa maculata*, Vieil. Pectoral Sandpiper. "Jack Snipe."*Tringa maculata*, Vieil., Wheat., Sehl., Blas., Dress., Sund., Hart., Coues, Schl. & Salv.*Tringa (Actodromas) maculata*, Cass., Ridg.*Actodromas maculata*, Coues, Allen, Verr., Lawr., Coop., Mayn.*Pelidna pectoralis*, Bp., Cass.*Tringa pectoralis*, Say, Bp., Nutt., Gm., Eyt., Keys. & Blas., Aud., Temm., Gir., DeKay, Schl., Gray, Meyer, Reinh., Sund.*Tringa dominicensis*, Degl.Length, 9; wing, $5\frac{1}{4}$; tail, $2\frac{1}{2}$.*Hab.*—North, Central, and South America, West Indies, Greenland, Europe. (Coues.)

Not uncommon in September and October. The first I met with was feeding with a small flock of Semipalmated Sandpipers at Peniston's Pond, on August 3, 1874. It was tolerably abundant till towards the end of October, being usually found singly. Colonel Wedderburn says of this species (Nat. in B., p. 44): "On the 9th October, 1849, they appeared suddenly in thousands, particularly at St. George's, after a heavy gale of wind; the parade ground at that place was swarming with them, and I think Colonel Drummond killed some thirty or forty couple before breakfast; but, with the exception of a few stragglers, they were all gone by the following day."

108. *Tringa fuscicollis*, Vieil. Bonaparte's or White-rumped Sandpiper.*Tringa fuscicollis*, Vieil., Dress.*Tringa cinclus*, var., Say.*Tringa schinzii*, Bp., Nutt., Sw. & Rich., Aud., Eyt., Gray, Gir., DeKay.

Pelidna schinzii, Bp.

Tringa bonapartii, Schl., Gray, Cones, Schl. & Salv.

Actodromas (Heteropygia) bonapartii, Coues.

Actodromas bonapartii, Coues, Allen, Lawr., Verr., Mayn.

Tringa melanotos, Blas.

Actodromus melanotos, Bp.

Pelidna melanotos, Degl.-Gerbe., Bp.

Tringa dorsalis, Licht.

Length, $7\frac{1}{2}$; wing, 4.7; tail, 1.8.

Hab.—North America, east of Rocky Mountains; not observed in Alaska (where, however, its occurrence may be anticipated). Breeds in the far north. Migratory through United States in the Eastern Province. Winters in the Southern States, Greenland, West Indies, Central and South America. Accidental in Europe. (Coues.)

This bird did not occur in the autumn of 1874, to my knowledge. It is recorded by Colonel Wedderburn, and is, I believe, sufficiently numerous at times, especially in the Great Sound and Castle Harbor.

109. *Tringa maritima*, Brünn. Purple Sandpiper.

Tringa maritima, Brünn., Gm., Lath., Vieil., Temm., Less., Sab., Rich., Sw. & Rich., Bp., Nutt., Naum., Aud., Keys. & Blas., Schinz, Schl., Gir., and many later authors.

Tringa (Arquatella) maritima, Bd., Gray, Ridg.

Arquatella maritima, Cones, Verr., Allen, Lawr., Mayn.

Pelidna maritima, Bp.

Totanus maritimus, Steph.

(?) *Tringa striata*, Linn., Gm., Fab., Lath., Flem.

Tringa undata, Brünn., Gm., Lath., Vieil.

Tringa nigricans, Mont., Leach, Brehm.

Trynga arquatella, Pall.

Tringa canadensis, Lath., Vieil.

Tringa littoralis, Brehm.

Length, 8 to 9; wing, 5; tail, $2\frac{1}{2}$.

Hab.—North America, northerly and chiefly coastwise, south to the Middle States in winter, Great Lakes. Greenland, Europe, Asia. (Coues.)

One was seen by Colonel Wedderburn at the entrance to St. George's Harbor.

Genus CALIDRIS, Cuv.

110. *Calidris arenaria*, (Linn.) Ill. Sanderling.

Tringa arenaria, Linn., Schl., Aud.

Calidris arenaria, Ill., Leach, Temm., Licht., Bp., Flem., Brehm., Sw. & Rich., Nutt., Naum., and authors generally.

Charadrius calidris, Linn., Wils.

Charadrius rubidus, Gm., Wils.

Arenaria vulgaris, Bechst., Temm., Steph.

Trynga tridactyla, Pall.

Calidris tringoides, Vieil.

Calidris americana, Brehm.

Length, $7\frac{3}{4}$ to 8; wing, 5; tail, 2.

Hab.—Sea-coasts of nearly all countries. (Coues.)

Generally to be found in the autumn months, especially on the sandy beach below the sand-hills, where I obtained specimens in November, 1874. One of these I lost temporarily, and on recovering it the next day I found that not only the body, but the webs and *shafts* of the feathers had been devoured by a swarm of voracious ants.

Sub-family TOTANINÆ.

Genus LIMOSA, Briss.

111. *Limosa hudsonica*, (Lath.) Sw. Hudsonian Godwit.

Scolopax alba et candida, Linn.

Scolopax lapponica, var. β , Gm.

Scolopax hudsonica, Lath.

Limosa hudsonica, Sw. & Rich., Nutt., Aud., Bp., Gir., Bd., Sel., Cab., Sel. & Salv., and later authors.

Limosa melanura, Bp., not of authors.

Limosa ægocephala, Bp., not of authors.

Limosa australis, Gray.

Length, 15; wing, 8; tail, 3.

Hab.—Northern and Eastern North America; West Indies; South America; not noted west of Rocky Mountains; rare along Atlantic. (Coues.)

A specimen of this bird in Mr. Bartram's collection was shot near the Causeway at St. George's in the autumn of 1875.

Genus SYMPHEMIA, Rafin.

112. *Symphemia semipalmata*, (Gm.) Hartl. Willet.

Scolopax semipalmata, Gm., Lath., Wils.

Totanus semipalmatus, Temm., Bp., Sw. & Rich., Aud., Gir., Coues.

Totanus (Catoptrophorus) semipalmatus, Bp., Nutt.

Catoptrophorus semipalmatus, Bp., Blas.

Glottis semipalmata, Nilss.

Hodites semipalmata, Kaup.

Symphemia semipalmata, Hartl., Bd., Cab., Sel., Cass., Coop. & Suck., and late authors.

Totanus crassirostris, Vieil.

Symphemia atlantica, Rafinesque.

Length, about 15; wing, $8\frac{1}{4}$; tail, $3\frac{1}{4}$.

Hab.—Temperate North America, north to 56° , but chiefly United

States; resident in the Southern States, West Indies, Central and South America. Accidental in Europe. (Coues.)

One was shot by Colonel Wedderburn on Pearl Island on July 3, 1848; doubtless a young bird driven by stress of weather from the breeding haunts of the species on the North American shores.

Genus GAMBETTA, Kaup.

113. *Gambetta melanoleuca*, (Gm.) Bp. Greater Yellow-shanks; Tattler.

Scolopax melanoleuca, Gm., Lath.

Totanus melanoleucus, Vieil., Licht., Bp., Aud., Coues, Finsch.

Gambetta melanoleuca, Bp., Bd., Coop. & Suck., Coues & Prent., Hayd., Verr.,

Allen, Dress., Lawr., Dall & Bann., Mayn.

Scolopax vociferus, Wils.

Totanus vociferus, Sab., Sw. & Rich., Nutt., Aud., Gir., Putn., Trippe.

Totanus sasashew, Vieil.

Totanus chilensis, Philippi.

Length, about 14; wing, $7\frac{1}{2}$ to 8; tail, $3\frac{1}{4}$ to $3\frac{1}{2}$.

Hab.—The Western Hemisphere; breeds mostly in high latitudes; abundant. (Coues.)

More or less common, arriving early in August, remaining for a month or so. Much in request among the energetic sportsmen who brave the heat and mosquitoes for the sake of a "bag" of "snippets." Its quadruple note, "thew-thew-thew-thew," is very loud and striking. Mr. Hurdis mentions one killed, when on its northward migration, on the 5th June, 1852. Another was shot by Lieutenant Denison on the 27th April, 1875, and one seen at the same time, but not obtained.

114. *Gambetta flavipes*, (Gm.) Bp. Yellow-shanks; Lesser Tell-tale.

Scolopax flavipes, Gm., Lath., Wils.

Totanus flavipes, Vieil., Bp., Sab., Sw. & Rich., Nutt., Aud., Gir., Moschl., Putn., Reinh., Yarr., Newton, Trippe, Coues, Ridg.

Gambetta flavipes, Bp., Bd., Coues & Prent., Verr., Allen, Coues, Dress., Lawr., Dall & Bann., Mayn., Trippe, Snow.

Totanus fuscocapillus et natator, Vieil.

Length, 10 to $10\frac{1}{2}$; wing, 6 to $6\frac{1}{2}$; tail, $2\frac{1}{2}$.

Hab.—Western Hemisphere; many winter in Southern States; accidental in Europe. (Coues.)

The most conspicuous and noisy of the August arrivals. It has been seen as early as the 13th July, but usually disappears towards the end of September. Considerable numbers fall victims to the gun, as they are not bad eating. If a wounded one falls into the water it is possible to shoot the whole of the flock, as they hover over their unfortunate companion. This murderous proceeding is alluded to, I think, by Wilson. The only instances of the occurrence of this species in the spring

took place in 1875, when I saw one on the 26th, and obtained two at Peniston's Pond on the 29th April. These were, of course, in beautiful plumage.

Genus RHYACOPHILUS, Kaup.

115. *Rhyacophilus solitarius* (Wils.), Cass. Solitary Sandpiper.

Tringa ochropus, var β , Lath.

Tringa solitaria, Wils.

Totanus solitarius, Aud., Gir., Hoy, Schl., Gray, Hart., Coues.

Rhyacophilus solitarius, Cass., Coues & Prent., Hayd., Verr., Allen, Coues, Dress., Lawr., Dall & Bann., Mayn., Stev.

Totanus chloropus, var. *solitarius*, Ridg.

Totanus chloropygius, Vieil., Bp., Sw. & Rich., Wagl., Nutt., Aud.

Rhyacophilus chlorophygius, Bp.

Totanus glareola, Ord.

Totanus macroptera, Spix.

Length, 8 to $8\frac{1}{2}$; wing, 5; tail $2\frac{1}{4}$.

Hab.—Western Hemisphere; accidental in Europe; North to Alaska; winters in Mexico, Central and South America, and West Indies. (Coues.)

I observed one on the 19th July, 1874, but they generally come with the other species in August. They soon betake themselves to the wooded swamps, where they may be found singly or in pairs throughout the autumn. Fresh arrivals sometimes take place in the spring. Their habit of bobbing the head and body when alarmed is very comical.

Genus TRINGOIDES, Bp.

116. *Tringoides macularius*, (Linn.) Gray. Spotted Sandpiper.

Tringa macularia, Linn., Gm., Lath., Wils.

Totanus macularius, Temm., Boie, Flem., Eyt., Brehm, Bp., Nutt., Aud., Gir., Hoy, Trippe.

Actitis macularius, Boie, Naum., Bp., Keys & Blas., Schl., Finsch.

Tringoides macularius, Gray, Bd., Coop. & Suck., Coues, Hayd., Dress., Dall & Bann., Mayn., Allen, Stev., and most late U. S. authors.

Tringites macularius, Schl. & Salv.

Tringa notata, Ill.

Length, $7\frac{1}{2}$ to 8; wing, $4\frac{1}{2}$; tail, 2.

Hab.—North America at large; winters in Southern States and beyond; Central and South America to Brazil; West Indies; casual in Europe. (Coues.)

Flocks of young birds appear early in August, followed soon after by a limited number of adults. They frequent the same places as the other "snippets," and serve to swell the "bag" of the gunner in August and September. A few remain all the winter, and several examples have been observed in spring, presumably strangers on their way north. The

"weet-weet" of this bird, as it skims over the water like the European Common Sandpiper, is very familiar to residents in the islands.

Genus *ACTITURUS*, Bp.

117. *Actiturus bartramius*, (Wils.) Bp. Bartram's Sandpiper.

Tringa bartramia, Wils., Aud., Gir., Putn., Trippe.

Tringa (Euliga) bartramia, Nutt.

Totanus bartramius, Temm., Bp., Sw. & Rich., Aud., Hoy.

Actiturus bartramius, Bp., Bd., Coues & Prent., Hayd., Verr., Allen, Coues, Lawr., Sl., Dress., Cab., and late authors.

Tringoides bartramius, Gray, Pelz.

Actitis bartramius, Schl.

Tringa longicauda, Bechs., Naum.

Actiturus longicaudus, Blas.

Bartramius longicaudus, Bp.

Totanus variegatus, Vieil.

Bartramia laticauda, Less.

Length, about 12; wing, $6\frac{1}{2}$; tail, $3\frac{1}{2}$.

Hab.—North America, north to the Yukon; not observed in United States west of the Rocky Mountains; Atlantic coast of Nova Scotia; winters in Mexico, West Indies, Central and South America to Brazil; casual in Europe; Australia. (Coues.)

No early records. One in my collection was shot by Gibbs at Peniston's Pond on September 20, 1874. It was a single bird, and was in company with a flock of small Sandpipers at the time. Lieutenant Denison, Royal Engineers, shot a second specimen in a field near Peniston's Pond on the 18th September, 1875.

Genus *NUMENIUS*, Linn.

118. *Numenius hudsonicus*, Lath. Hudsonian Curlew.

Scolopax borealis, Gm., Wils.

Numenius borealis, Ord., Brewer.

Numenius hudsonicus, Lath., Bp., Sw. & Rich., Nutt., Aud., Gir., Bd., Reinh., Dress., and late authors generally.

Numenius intermedius, Nutt.

Numenius rufiventris, Vig.

Numenius phaeopus, Cab., Pelz.

Numenius brasiliensis, Maxim.

Length, about 18; wing, 9; tail, 4; bill, 3 to 4.

Hab.—North America; Greenland; Central and South America; no West Indian record; migratory through United States; winters in Southern States and far beyond. (Coues.)

Appears early in August, in limited numbers, and is so wary that very few are ever obtained. Mr. Hurdis says: "In August and September the loud whistle of this Curlew is sometimes heard on the shores of Ber-

muda. It is generally seen alone, and from its wary habits is difficult to approach. Of the four specimens which I examined, one was shot on the 14th August, and the remainder in September. During the dark nights of this season of the year flocks of this Curlew occasionally pass at a low elevation toward the south, disturbing the profound tranquility which reigns by their oft-repeated, clear, whistling note."

119. *Numenius borealis*, (Forst.) Lath. Esquimaux Curlew.

Scelopax borealis, Forst.

Numenius borealis, Lath., Bp., Sw. & Rich., Nutt., Aud., Gir., Bd., Coues, Verr., Allen, Salv., and modern authors generally.

Numenius brevirostris, Licht., Darw., Pelz.

Numenius microrhynchus, Phil. & Landb.

Length, about $13\frac{1}{2}$; wing, $8\frac{1}{4}$; tail, 3; bill, $2\frac{1}{4}$ to $2\frac{1}{2}$.

Hab.—North and Middle America; not recorded west of Rocky Mountains; Alaska; winters in Middle and South America; no West Indian record; accidental in Europe; breeds within the Arctic circle. (Coues.)

Commoner and easier to approach than the preceding. Locally termed "Wood Snipe." A good number accompanied the Golden Plover on their arrival in September, 1874, and several were killed along the north shore. Both species of Curlew remain but a short time. The Esquimaux is easily distinguishable from the Hudsonian Curlew by its smaller size and comparatively short and weak bill.

Sub-order HERODIONES.

Family TANTALIDÆ.

Sub-family IBIDINÆ.

Genus IBIS, Möhring.

120. *Ibis falcinellus*, Bp. Glossy Ibis.

Tantalus mexicanus, Gm., Lath., Ord.

Ibis falcinellus, Bp., Nutt., Aud., Allen, Ridg.

Ibis falcinellus var. *ordii*, Coues.

Ibis ordii, Bp., Bd., Allen, Lawr., Coues, Mayn.

Falcinellus ordii, Bp., Coues.

Length, 25; wing, 12; tail, $4\frac{3}{4}$.

Hab.—United States, southerly, straying north to Massachusetts and Ohio. (Coues.)

An inhabitant of the Southern United States, separated from the European species by Bonaparte in 1838, but now considered indetical with it. One example only has occurred in Bermuda, seen by Mr. Hurdis, but not obtained.

Family ARDEIDÆ.

Sub-family ARDEINÆ.

Genus ARDEA, Linn.

121. *Ardea herodias*, Linn. Great Blue Heron.

Ardea herodias, Linn., Gm., Lath., Wils., Temm., Bp., Sw. & Rich., Nutt.,
Aud., Gir., Bd., Sel., Newton, and authors generally.

Ardea hudsonias, Linn., Gm., Lath.

Length, 42; wing, 18½.

Hab.—North America to Hudson's Bay and Sitka; south to Guatemala and Galapagos; West Indies; breeds throughout its range; winters in the south. (Coues.)

Of this fine species Colonel Wedderburn says (Nat. in B., p. 38): "Many of these birds arrive in autumn, and a few remain throughout the year. In 1846 the nest of this bird, containing two eggs, was found amongst the mangrove trees at Hungry Bay. The Rev. H. B. Tristram kept one of these Herons alive in his garden (at the parsonage in Ireland Island), which was once seen to seize a Ground Dove and swallow it entire." I made numerous inquiries, and kept a careful lookout, but was unable to ascertain whether any second instance occurred of the nest being found. Most of the examples obtained or seen during my stay were in immature plumage. A few were always to be seen singly among the islands in the Great Sound and Castle Harbor, being very wary and hard to approach.

122. *Ardea egretta*, (Gm.) Gray. Great White Egret.

Ardea egretta, Gm., Lath., Wils., Nutt., Aud., Coues.

Herodias egretta, Gray, Bd., Coues & Prent., Allen, Coues, Dress., Lawr.,
Mayn.

Herodias alba var. *egretta*, Ridg.

Herodias egretta var. *californica*, Bd.

Ardea leuce, Ill., Licht.

Egretta leuce, Bp.

Herodias leuce, Brehm.

Ardea alba, Bp.

Length, 39; wing, 15½.

Hab.—United States southerly, straggling northward to Nova Scotia, Massachusetts, Canada West, and Minnesota; West Indies, Mexico, Central and South America. (Coues.)

Two were killed at Hungry Bay in 1840; several were subsequently seen, but not obtained. A colored youth described two of these birds to me as having been seen by him in Warwick Swamp in October, 1874,

adding that he shot one, but it was too much knocked about to keep. These may have belonged to the next species; but, from the size mentioned, I fancy them to be referable here. Mr. Bartram has obtained one specimen. Lieutenant Denison, Royal Engineers, informs me that one was shot in Devonshire Swamp by Captain Hussey, Twentieth Regiment, on the 6th October, 1875, and presented to him.

123. *Ardea candidissima*, Gm. Snowy Heron.

Ardea nivea, Jacq., Lath., Licht.

Egretta nivea, Cab.

Ardea candidissima, Gm., Wils., Bp., Nutt., Aud., Gir., Coues.

Egretta candidissima, Bp., Gosse.

Herodias candidissima, Gray, Gundl.

Garzetta candidissima, Bp., Bd., Cass., Allen, Coues, Sel. & Salv., Dress., Lawr., Mayn., Ridg.

Ardea carolinensis, Ord.

Length, 24; wing, 10.20.

Hab.—United States southerly. North, regularly to Middle States; casually, to Massachusetts and even Nova Scotia. Kansas; Mexico; West Indies; Central and South America to Chili. Resident in Gulf States and farther south.

Two beautiful specimens, in full plumage, were shot by Colonel Wedderburn in April, 1850, and several were seen in September following. Thus it seems that it visits the islands both in spring and autumn at the usual periods of migration. Mr. Bartram has a pair in his collection.

124. *Ardea cœrulea*, Linn. Little Blue Heron.

Ardea cœrulea, Linn., Gm., Lath., Wils., Ord., Bp., Aud.

Ardea (Botaurus) cœrulea, Bp., Nutt.

Egretta cœrulea, Bp., Gosse.

Florida cœrulea, Bd.

Herodias cœrulea, Gray, Gundl.

Ardea cœrulescens, Lath., Licht., Wagl.

Length, 22; wing, 11.

Hab.—South Atlantic and Gulf Coast to Mexico. (Baird.)

Mr. Hurdis says: "Of seven specimens of this heron which came under my observation, four were shot in April and May, and three in September and October; it may therefore be considered both a vernal and autumnal visitor to the Bermudas. Three of the spring specimens were beautiful exemplifications of the change from the white plumage of the young to the rich vinous purple of the adult bird." Several of these examples are alluded to by Colonel Wedderburn in his notes. I do not think the bird visits the islands regularly. I obtained a beau-

tiful male from Hungry Bay on the 4th of May, 1875. It was in company with a white bird, perhaps an immature specimen of the same species.

125. *Ardea virescens*, Linn. Green Heron.

Ardea virescens, Linn., Gm., Lath., Wils., Bp., Wagl., Nutt., Aud., Gir., Sund., Coues.

Ardea (Botaurus) virescens, Bp.

Herodias virescens, Boie, Bp., Gosse.

Egretta virescens, Sw.

Butorides virescens, Bp., Sel., Sel. & Salv., Bd., Newton, and most recent authors.

Ardea ludoviciana, Gm., Lath.

Ardea chloroptera et maculata, Bodd.

Length, 15; wing, $7\frac{1}{2}$.

Hab.—United States generally, breeding throughout and wintering in the south; Canada West; Mexico; West Indies; Central America to Venezuela. (Coues.)

Occurs on both migrations, sometimes in considerable numbers in the spring, frequenting the dense mangroves, and being uncommonly hard to obtain. Lieutenant Denison and I each shot two beautiful specimens in April, 1875.

Genus NYCTIARDEA, Sw.

126. *Nyctiardea grisea* var. *nævia*, (Bodd.) Allen. American Night Heron.

Botaurus nævius, Briss.

Ardea nævia, Bodd.

Nyctiardea nævia, Gray.

Nycticorax nævia, Gray, Sel. & Salv.

Nyctiardea grisea var. *nævia*, Allen, Coues.

Nycticorax griseus, Reinh., Allen.

Ardea hoactli, Gm., Lath.

Ardea gardeni, Gm., Lath.

Nycticorax gardeni, Jard., Sp., Gundl., Sel., Sel. & Salv.

Nyctiardea gardeni, Bd., Coop. & Suck., and many late U. S. authors.

Nyctiardea grisea var. *gardeni*, Ridg.

Ardea nycticorax, Wils., Bp., Aud.

Ardea discors, Nutt.

Nycticorax americanus, Bp., Tsch., Gosse.

Length, about 25; wing, 12.50; tarsus, 3.15; bill, 3.10.

Hab.—United States and British Provinces; breeds abundantly in New England; winters in the South and beyond. Part of West Indies, Mexico, Central America, South America.

Immature birds are not uncommon in the larger mangrove swamps in the autumn and winter, but none have yet been obtained in adult plumage. One examined by Mr. Hurdis, shot on the 9th February,

had the irides bright carmine, and the long filamentous plumes of the occiput beginning to appear. These birds sit motionless among the mangroves, and when disturbed fly into the tops of the thickest trees, whence they are very hard to dislodge. I obtained a few specimens during my stay.

127. *Nyctiardea violacea*, (Linn.) Sw. Yellow-crowned Night Heron.

Ardea violacea, Linn., Gm., Lath., Wils., Bp., Aud.

Ardea (Botaurus) violacea, Bp., Nutt.

Nyctiardea violacea, Sw.

Nycticorax violaceus, Bp.

Nyctherodius violaceus, Reich., Bp., Gundl.

Ardea jamaicensis, Gm.

Ardea cayanensis, Gm.

Ardea serretacca, Vieil.

Ardea callocephala, Wagl.

Length, 24; wing, 12; tarsus, 3.70; bill, 2.78.

Hab.—South Atlantic and Gulf States. South America. (Baird.)

Unlike its congener, this Heron has occurred in the plumage of the adult. Mr. Bartram has obtained several fine specimens. I obtained two myself, but both were in the spotted garb of youth. There is a great similarity between the young of these two species, but *violacea* may always be distinguished in any plumage, by its longer tarsus and shorter bill. Occurs pretty regularly in small numbers, usually in autumn, but occasionally in spring. One of my specimens was shot as early as the 3d August.

Genus BOTAURUS, Steph.

128. *Botaurus lentiginosus*, (Mont.) Steph. American Bittern.

Botaurus freti-hudsonis, Briss., Degl.

Ardea freti-hudsonis, Schl.

Ardea hudsonias, Merr.

Ardea stellaris var., Forst.

Ardea stellaris var. β .

Botaurus freti-hudsonis, Lath.

Ardea stellaris var. β . *minor*, Gm.

Ardea minor, Wils., Bp., Aud.

Botaurus minor, Boie., Bp., Gundl., Gray, Coues.

Ardea lentiginosa, Mont., Jen., Leach., Temm., Flem., Eyt., Keys. & Blas., Sab., Sw. & Rich., Nutt., Aud., Gir., Trippe.

Botaurus lentiginosus, Steph., Gray, Bd., Coop. & Suck., Coues, Hayd., Cass., Mayn., Dress., Salv., and many recent authors.

Butor lentiginosus, Jard.

Butor americana, Sw.

Ardea mokoko, Vieil., Wagl.

Ardea adspersa, Licht.

Length, 26.50; wing, 11.00; tarsus, 3.60; bill, 2.75.

Hab.—Entire temperate North America up to 58° or 60°; Cuba; south to Guatemala; regularly migratory; accidental in Europe. (Coues.)

A regular visitor in the autumn, and occasionally in March, frequenting the sedgy patches on the edges of the mangrove swamps. Mr. Hurdis says: "The stomach of one, shot in the Pembroke Marshes, contained an eel 6 inches long, a mouse, a dragonfly, a grasshopper, and part of a small golden carp." To show how plentifully they arrive in certain years, I may mention (though a cold shudder passes through me as I do so) that no less than *thirteen* were shot by one officer, who shall be nameless, in the autumn of 1875.

Genus ARDETTA, Gray.

129. *Ardetta exilis*, (Gm.) Gray. Least Bittern.

Ardea exilis, Gm., Lath., Wils., Wagl., Nutt., Aud., Gir., Newb.

Ardea (Ardeola) exilis, Bp.

Ardeola exilis, Bp., Gosse, Hoy.

Butor exilis, Sw.

Ardetta exilis, Gray, Gundl., Bd., Sel., Coues & Prent., Verr., Allen, Coues, Lawr., Dress., Mayn., Salv., Ridg., &c.

Length, 13.00; wing, 4.75; tarsus, 1.60; bill, 1.75.

Hab.—United States and British Provinces; breeds throughout its United States range, wintering in the South, Cuba, Jamaica, Central (and South?) America. (Coues.)

Has occurred both in spring and autumn, but, from its frequenting the thick mangrove swamps and hiding among their tangled roots, has not very often been obtained. Colonel Wedderburn procured several specimens between 1847 and 1850. I shot a female near the Sluice-gates on March 1, 1875, and Lieutenant Denison records one shot at Basden's Pond in December, 1875.

Sub-order ALECTORIDES.

Family RALLIDÆ.

Sub-family RALLINÆ.

Genus RALLUS, Linn.

130. *Rallus virginianus*, Linn. Virginian Rail.

Rallus virginianus, Linn., Gm., Wils., Bp., Nutt., Aud., Gir., Gundl., Bd., Coop. & Suck., Sel. & Salv., Dress., and modern authors.

Aramus (Pardirallus) virginianus, Gray.

Rallus aquaticus var. β , Lath.

Rallus limicola, Vieil.

Length, about $7\frac{1}{2}$; wing, 4; tail, $1\frac{1}{2}$.

Hab.—Entire United States and British Provinces; breeds commonly in New England; winters in Southern States and beyond. South to Guatemala; Cuba. (Coues.)

One was shot by Mr. Hurdis on the 6th November, 1851. He remarks: "This is the only genuine *Rail* met with—a singular circumstance, when we bear in mind that *all* the Gallinules and Crake-Gallinules known to the continent of North America have been obtained in the Bermudas." No other instance of this bird's occurrence is on record.

Genus PORZANA, Vieil.

131. *Porzana carolina*, (Linn.) Cab. Sora Rail; Carolina Rail.

Rallus carolinus, Linn., Gm., Bp., Sw. & Rich., Aud.

Rallus (*Crex*) *carolinus*, Bp., Nutt.

Gallinula carolina, Lath., Sab.

Ortygometra carolina, Bp., Aud., Gosse, Gir., Reinh.

Porzana carolina, Bd., Gundl., Sel., Newton, Dress., Hayd., Sel. & Salv., Lawr., Sund., and of all late U. S. writers.

Aramides (*Mustelirallus*) *carolina*, Gray.

Crex carolina, Hart.

Rallus stolidus, Vieil.

Length, about $8\frac{1}{2}$; wing, $4\frac{1}{4}$; tail, 2.

Hab.—Entire temperate N. A., winters in Southern States and beyond. South to Venezuela. Various West Indian Islands. Greenland. Accidental in Europe. (Coues.)

Visits Bermuda regularly, arriving early in September (one has been shot on the 24th August) and remaining till November, a few lingering on through the winter. On their vernal migration they frequently appear in considerable numbers in March and April. I have seen them as late as the 1st May. An extraordinary large flight visited the islands in October, 1849, departing in a body after a three-weeks' stay. These birds are a great nuisance to the gunner in search of snipe and other denizens of the marshes, as they bother a dog sadly both by their numbers and their skulking habits; and they themselves are not worth powder and shot, except immediately after their arrival.

132. *Porzana noveboracensis*, (Gm.) Cass. Little Yellow Rail.

Fulica noveboracensis, Gm.

Gallinula noveboracensis, Lath.

Ortygometra noveboracensis, Steph., Bp., Aud., Gir., Putn.

Rallus noveboracensis, Bp., Nutt., Sw. & Rich., Aud.

Coturnicops noveboracensis, Bp.

Porzana noveboracensis, Cass., Coues & Prent., Allen, Coues, Dress., Sel. & Salv., Lawr., Mayn., Ridg.

Aramides (*Coturnicops*) *noveboracensis*, Gray.

Perdix hudsonica, Lath.

Rallus ruficollis, Vieil.

Length, about 6; wing, $3\frac{1}{4}$; tail, $1\frac{3}{4}$.

Hab.—Eastern North America, north to Hudson's Bay, but in New England not observed beyond Massachusetts. Apparently nowhere abundant. Winters in Southern States.

Two obtained in Pembroke Marsh by Colonel Wedderburn in October, 1847, but not since recorded.

133. *Porzana jamaicensis*, (Gm.) Cass. Little Black Rail.

Rallus jamaicensis, Gm., Lath., Aud.

Ortygometra jamaicensis, Steph., Bp., Aud., Gosse., Salv.

Creciscus jamaicensis, Cab., Gundl.

Porzana jamaicensis, Cass., Coues & Prent., Sci., Sci. & Salv., Schl., Coues, Ridg.

Aramides (Creciscus) jamaicensis, Gray.

Crex pygmaea, Blackwell.

Ortygometra chilensis, Bp.

Length, about 5; wing, $3\frac{1}{4}$; tail, $1\frac{1}{2}$.

Hab.—South America to Chili. Central America. West Indies. North America to New Jersey and Kansas, rare.

Observed, and also obtained, by Colonel Wedderburn in 1847 and 1848, and by Mr. Hurdis in 1851, always in the autumn.

Genus CREX, Bechst.

134. *Crex pratensis*, Bechst. Land-Rail; Corn-Crake.

Rallus crex, Linn., Degl.

Gallinula crex, Lath.

Crex pratensis, Bechst., Cass., and authors generally.

Length, about 10; wing, $5\frac{1}{2}$; tail, 2.15.

Hab.—Europe; Greenland; Accidental on Atlantic coast of United States. (Baird.)

Colonel Wedderburn shot the only specimen of this European bird ever obtained in Bermuda, on the 25th October, 1847, and sent a notice of its occurrence to "The Zoologist" in 1849. At that time it was probably not known that the species is a straggler to the United States, but laterally several instances of its appearance there have been recorded, so that the fact of its being killed in Bermuda has lost much of the mystery which was originally connected with it.

Sub-family FULICINÆ.

Genus GALLINULA, Briss.

135. *Gallinula galeata*, (Licht.) Bp. Florida Gallinule.

Crex galeata, Licht.

Gallinula galeata, Bp., Nutt., Maxim., Tsch., Gosse, Gundl., Bd., Newton, and most late authors.

Gallinula chloropus, Bp., Aud., Gir.

Gallinula chloropus, var. *galeata*, Hartl. & Finsch, Ridg.

Length, about $12\frac{1}{2}$; wing, $6\frac{3}{4}$; tail, 3.

Hab.—Southern countries of North America; Louisiana, Florida, Texas; South America. Accidental in Middle and Northern States. (Baird.)

Resident, tolerably abundant, breeding in the flags and sedges in the deepest and most inaccessible parts of the marshes. Also migratory, visitors appearing in October. Like the "Sora," this is a sad pest to the snipe-shooter when working the thick places, unless his dog be as steady as old Time.

With regard to the specific distinction between this bird and *G. chloropus* of Europe, it would appear that there is so little difference that "doctors disagree" on the question. I never compared specimens myself, but Mr. Hurdis says, in his MS. notes: "On a careful comparison of British specimens with those shot in the Bermudas the resemblance of the two was so strongly marked that, in my humble opinion, they are identical."

Genus PORPHYRULA, Blyth.

136. *Porphyryula martinica*, (Linn.) Blyth. Purple Gallinule.

Fulica martinica, Linn.

Gallinula martinica, Lath., Bp., Nutt., Aud.

Crex martinica, Licht.

Porphyrio martinica, Gosse, Cab.

Fulica martinicensis, Jacq., Gm.

Ionornis martinicensis, Reich.

Fulica flavirostris, Gm.

Porphyrio tavona, Vieil.

Porphyrio cyanicollis, Vieil.

Gallinula porphyrio, Wils.

Porphyrio americanus, Sw.

Martinico gallinule, Lath.

Length, $12\frac{1}{2}$; wing, 7; tail, 3.

Hab.—Southern States of North America, Louisiana, Florida. Accidental in Middle and Northern United States. (Baird.)

Several were obtained in 1849 and 1850, in the month of April, and one on the 30th May, 1851. Mr. Hurdis's notes contain the following: "On the 22d October, 1851, I shot one of these Gallinules in the olive-green plumage of the young, and as these birds never remain to breed in the Bermudas, this specimen must have found its way over sea. I know of no other instance of the young being met with. In April, 1852, this Gallinule was again observed, and in June, 1853, I examined a specimen preserved by W. Clutterbuck, esq., Fifty-sixth Regiment; date of its occurrence unknown. Its appearance, with one exception, has been vernal."

Mr. Bartram has several specimens. I am almost sure I saw one in Devonshire Swamp in February, 1875. The shy habits and nature of the haunts of this species doubtless prevent many examples being recorded in the visiting list.

Genus *FULICA*, Linn.

137. *Fulica americana*, Gm. American Coot.

Fulica americana, Gm., Lath., Bp., Sw. & Rich., Sab., Nutt., Aud., Bd., Coues, and of all late American writers—Sel., Sel. & Salv., Sund., Reinh., Gosse.

Fulica wilsoni, Steph.

Fulica atra, Wils.

Length, about 14; wing, 7; tail, 2.

Hab.—Entire temperate North America, Alaska, Greenland, Mexico, West Indies, Central America. (Coues.)

A regular visitor in autumn, but never in great numbers. It also occurs on its northward journey, for Mr. Hurdis records one killed at Somerset on the 28th May, 1847, and I watched one close to me at Basden's Pond on the 27th April, 1875.

Order LAMELLIROSTRES.

Family PHÆNICOPTERIDÆ.

Genus PHÆNICOPTERUS, Linn.

138. *Phœnicopterus ruber*, Linn. American Flamingo.

Phœnicopterus ruber, Linn., Gm., Wils., Bp., Nutt., Aud.

Length, 45 inches; wing, 16.50; tarsus, 12; bill, 5.90.

Hab.—Warmer parts of America. Rare on the Florida Keys. (Baird.)

Though never actually obtained in the Bermudas, I think the following interesting account from Mr. Hurdis's MS. notes entitles this fine bird to a place in the island list: "On the 24th September, 1849, being two days after the occurrence of an extraordinary flight of the Swallow tribe, I happened to be skirting the shore of Hungry Bay in search of novelties, when, peering through the roots of the belt of mangrove trees by which the shallow water of the bay is surrounded, a large white, or greenish-white, bird, which I took to be some tall species of Heron, was discovered standing in a very upright position within long shot of me. In the hurry of the moment I unfortunately discharged the barrel of my gun which was loaded with small shot, and the stranger was soon afterwards seen topping the mangroves in an easterly direction.

“Two days afterwards I met Stone, the town constable, who was in pursuit of the tall white bird when I fired at it, and, from being concealed among the mangroves, had a fair opportunity of observing its form and appearance, who confidently asserted that it was ‘no Heron.’ He described the bird as brownish-white in plumage with a very long neck, equally long legs, and a peculiar bill something like a parrot’s. Referring to Wilson’s print of the Wood Ibis (*Tantalus loculator*), he at once said it was too long in the bill and too heavy in the formation of the neck and body for the bird he saw. His eye then caught sight of Wilson’s figure of the Flamingo, which he said was precisely the shape and make of the bird in question, and the form of the bill exactly similar. Now, the only part of the tall stranger concealed from my observation was the head; I have therefore no doubt whatever, judging from Stone’s testimony, and from what I observed myself, that this bird was a Flamingo in the immature greyish-white plumage of the first year. Stone informed me that he followed this Flamingo to Peniston’s Pond, distant about two miles, where he shot at it without success. As the bird was not met with afterwards it no doubt took its departure from the Bermudas.”

Family ANATIDÆ.

Sub-family CYGNINÆ.

Genus CYGNUS, Linn.

139. *Cygnus americanus*, Sharpless. American or Whistling Swan.

Cygnus musicus, Bp., Linsl.

Cygnus bewickii, Sw. & Rich., Nutt.

Cygnus ferus, Nutt.

Cygnus americanus, Sharpless, Aud., Gir., Coop. & Suck., Bd., Coues & Prent., Coues, Lawr., and authors generally.

Olor americanus, Bp.

Length, 55; wing, 22.00; tarsus, 4.25.

Hab.—Continent of North America; breeding only in the far north; wintering in United States. (Coues.)

One was shot in White’s Marsh, near Hamilton, in 1835 or 1836, as related to Mr. Hurdis by credible witnesses in 1850. It was observed in the marsh for three or four days before it was obtained (by a man named Dunscomb), and was by no means shy or difficult of approach. It was sold, as might have been expected, as an article of food, and realized the sum of \$3. (Hurdis.)

Sub-family ANSERINÆ.

Genus ANSER, Linn.

140. *Anser hyperboreus*, Pall. Snow Goose.

Anser hyperboreus, Pall., Vieil., Steph., Bp., Sw. & Rich., Nutt., Aud., Temm., Gir., Schl., Gray, and most late authors.

Anas hyperboreus, Gm., Lath., Wils., Rich., Temm.

Chen hyperboreus, Boie, Bp., Gosse, Blas., Gundl., Degl. & Gerbe.

Chionoche hyperborea, Reich.

Anas nivalis, Forst.

Anser niveus, Briss., Brehm.

Tadorna nivea, Brehm.

Length, about 30; wing, 16.40.

Hab.—Whole of North America; breeds in higher latitudes, wintering in United States; abundant in the interior and along Pacific coast, rare on the Atlantic; Greenland, transient. Cuba. Rare or casual in Europe. (Coues.)

Colonel Wedderburn's notes contain the following: "On the 19th October, 1848, Mr. Hodgson Smith shot two of these birds, in their young plumage, at Riddle's Bay; but, unfortunately for the ends of science, they furnished the dinner-table instead of the cabinet." Mr. Hurdis adds: "A wing pertaining to one of the specimens mentioned by Major Wedderburn was fortunately saved by Mr. Smith, which removed all doubts as to the species it belonged to. In October, 1849, two 'White Geese' were observed in Mangrove Bay, and on the 9th November, 1851, four dark grey-coloured Geese were seen on the wing near Peniston's Pond. These were doubtless *A. hyperboreus*." I may here remark that the Blue Goose, *A. caerulescens*, much resembles the young of *A. hyperboreus*, and that consequently the birds *seen* may possibly have belonged to the former species.

Genus BERNICLA, Steph.

141. *Bernicla canadensis*, (Linn.) Boie. Canada Goose.

Anas canadensis, Linn., Gm., Forst., Lath., Wils., and all earlier authors.

Anser canadensis, Vieil., Flem., Keys & Blas., Bp., Sw. & Rich., Nutt., Aud., Eyt., De Kay, Gosse, Gir., Bd., Maxim., Schl.

Cygnus canadensis, Steph., Eyt., Jen.

Bernicla canadensis, Boie, Gray, Bp., Coop. & Suck., Coues, Verr., Reinh., Dress., Dall & Bann., and most late authors.

Branta canadensis, Gray, Bann., Coues.

Bernicla (Leucoblepharon) canadensis, Bd.

Branta (Leucoblepharon) canadensis, Gray.

Anser parvipes, Cass.

Length, 35; wing, 18; tarsus, 3.10.

Hab.—The whole of North America; breeding in United States, as well as further north; accidental in Europe. (Coues.)

Included in the list given in "The Naturalist in Bermuda," but with no information appended. It has been occasionally seen, but rarely obtained, in the islands. It was observed on three occasions during my stay, one being seen on Peniston's Pond in the autumn of 1874, one in the Great Sound on the 10th January, 1875, by the officers of the Fifty-third Regiment as they were leaving the islands on their homeward journey, and a third near Daniel's Head by Lieutenants Denison and Hussey, Royal Engineers, early in February, 1875. A man of colour was seen by these two officers to fire at the last-named bird; but he stupidly let drive at it, with small shot too, at a hundred and twenty yards, instead of paddling much nearer to it, as he might have done. A wild Goose, weighing ten pounds when plucked, was shot in Southampton parish on the 7th January, 1875, and eaten forthwith by the fortunate gunner or his friends. This undoubtedly belonged to the present species, but cannot be definitely recorded.

Sub-family ANATINÆ.

Genus ANAS, Linn.

142. *Anas boschas*, Linn. Mallard.

Anas boschas, Linn., Gm., Lath., Pall., Wils., Boie, Lecht., Bp., Temm., Vig., Aud., Schl., and authors generally.

Anas adunca, Linn., Gm., Jen., Donovan.

Anas domestica, Gm.

Anas (Boschas) domestica, Sw. & Rich., Nutt.

Anas curvirostra, Pall.

Anas freycineti, Bp.

Anas fera, Briss., Leach.

Length, 23; wing, 11; tarsus, 1.70.

Hab.—Nearly cosmopolitan; wild throughout the whole of North America; breeding sparingly in United States as well as further north. Greenland, Cuba, Bahamas, Panama. (Coues.)

A female was shot by an officer of the Fifty-sixth Regiment at Warwick Pond on November 3, 1854. It was in company with some tame ducks, always taking the wing moment any one approached the water (Nat. in B., p. 48). Four—a Mallard and three ducks—were observed in the Great Sound by Lieutenant Hussey, Royal Engineers, on the 23d December, 1874.

143. *Anas obscura*, Gm. Black Duck; Dusky Duck.

Anas obscura, Gm., Lath., Wils., Vieil., Steph., Bp., Nutt., Gray, Aud., Eyt., Gir., Cab., Bd., Coues, Schl., Lawr., and all authors.

Length, 22; wing, nearly 12; tarsus, 1.80.

Hab.—Eastern North America, especially along the Atlantic coast, from Labrador to Texas; Iowa, Kansas, Cuba. (Coues.)

Usually visits Bermuda in small numbers in the autumn, remaining till the end of January or even later. A flock of twenty frequented Harrington Sound and Peniston's Pond from Christmas, 1871, to February 15, 1872 (J. M. Jones). Specimens were obtained by Lieutenant Denison and myself in January, 1875, when there were a good many about. They are always very shy, and when disturbed frequently fly a long way out to sea.

Genus *DAFILA*, Leach.

144. *Dafila acuta*, (Linn.) Bp. Pintail.

Anas acuta, Linn., Gm., Lath., Temm., Boie, Licht., Less., Flem., Brehm., Wagl., Jen., Keys. & Blas., Degl., Schl., Wils., Bp., Nutt., Aud., Gir.

Dafila acuta, Bp., Gray, Gosse, Reich., Cass., Bd., Cab., Schl., Heerm., Coop. & Suck., Newton, Hayd., Jerd., Coues, and authors generally.

Querquedula acuta, Selby.

Anas sparmannii, Lath.

Anas caudacuta, Pall., Leach.

Dafila caudacuta, Steph., Gar., Eyt.

Querquedula caudacuta, Macgill.

Anas longicauda, Briss., Brehm.

Anas caudata, Brehm.

Dafila acuta, var. *americana*, Bp.

Length, 30; wing, 11; tail, 8.60; tarsus, 1.75.

Hab.—North America and Europe; breeds chiefly in high latitudes; in winter south to Panama; Cuba. (Coues.)

Several specimens were obtained, all in immature plumage, in the winter of 1847-'48. Mr. Bartram has a male in full plumage, shot by himself near St. George's. A female was shot by Gibbs in Smith's Marsh on the 26th October, 1875, as recorded by Lieutenant Denison, Royal Engineers.

Genus *CHAULELASMUS*, Gray.

145. *Chaulelasmus streperus*, (Linn.) Gray. Gadwall.

Anas strepera, Linn., Gm., Lath., Wils., Temm., Boie, Bp., Steph., Flem., Brehm., Nutt., Aud., Naum., Keys. & Blas., Gir., De Kay, Schl., Degl., Swin., and of most earlier authors.

Anas (Chauliodus) strepera, Sw. & Rich., Gen., Sw.

Chauliodus strepera, Sw., Eyt.

Chaulelasmus streperus, Gray, Bp., Gosse, Reich., Bd., Heerm., Jerd., Coues, Dress., and of authors generally.

Querquedula strepera, Macgill.

Anas strepera americana, Maxim.

Chaulelasmus americana, Bp.

Length, 22; wing, 10.50; tarsus, 1.64.

Hab.—North America generally; Europe, Asia, Africa. (Coues.)

A female Gadwall was captured alive in December, 1849, and was in the possession of Mr. Hurdis till May, 1851, associating with some tame ducks and laying several nests of eggs, none of which, however, proved fertile (Nat. in B., p. 47).

Genus MARECA, Steph.

146. *Mareca americana*, (Gm.) Steph. American Wigeon.

Anas americana, Gm., Lath., Wils., Bp., Nutt., Aud., Gir., Schl., Finsch.

Mareca americana, Steph., Sw. & Rich., Sw., Bp., Eyt., Gray, Gosse, Bd., Cab., Cass., ScL., and late authors generally.

Mareca penelope β , Blas.

Length, 21.75; wing, 11; tarsus, 1.42.

Hab.—North America, south of Guatemala; Cuba. Accidental in Europe. (Coues.)

After a revolving gale in October, 1854, several of these birds were shot and brought for examination to Mr. Hurdis, who obtained one himself in the following month (Nat. in B., p. 49). Two were shot at Devonshire Bay by Corporal Alder, Royal Engineers, in October, 1874.

Genus QUERQUEDULA, Steph.

147. *Querquedula carolinensis*, (Gm.) Steph. Green-winged Teal.

Anas crecca var., Forst.

Anas (*Boschas*) *crecca* var., Sw. & Rich., Nutt.

Anas crecca, Wils, Bp., Aud.

Anas carolinensis, Gm., Lath., Aud., Gir., Reinh., Maxim., Trippe.

Querquedula carolinensis, Steph., Eyt., Bp., Gray, Bd., Cass., ScL., ScL. & Salv., Coues.

Nettion carolinensis, Bd., Coop. & Suck., Coues, Hayd., Cab., ScL., Dress., Gund., and of late American authors.

Anas americana, Vieil.

Length, 14; wing, 7.40; tarsus, 1.14.

Hab.—Whole of North America; Greenland, Mexico, Cuba; south to Honduras. (Coues.)

This is an occasional visitor in autumn. One was shot at Peniston's Pond on October 10, 1874, and a few days later I stalked another in vain at the same place. Captain Rooke, Fifty-third Regiment, shot one in Devonshire Swamp in November, 1874. I am not aware of the occurrence of the European *Q. crecca*, or common Teal, in Bermuda. It occurs as a straggler in North America.

Lieutenant Denison informs me that four examples of *Q. carolinensis* were shot by Lieutenant Tallents, Twentieth Regiment, in the autumn of 1875.

148. *Querquedula discors*, (Linn.) Steph. Blue-winged Teal.

Anas discors, Linn., Gm., Lath., Wils., Vieil., Bp., Wagl., Aud., Gir., DeKay, Trippe, Schl.

Anas (*Boschas*) *discors*, Sw. & Rich., Nutt.

Querquedula discors, Steph., Gray, Bd., Cab., Sel., Sel. & Salv., Dress., Verr., Lawr., Sund., Coues, Dall & Bann., Allen, Trippe.

Cyanopterus discors, Eyt., Bp., Gosse, Blas.

Pterocyanea discors, Bp., Gray, Newb.

Length, 16; wing, 7.10; tarsus, 1.20.

Hab.—North America, chiefly east to Rocky Mountains; to the Pacific Coast in Alaska; West Indies, Mexico, Central and South America to Ecuador. (Coues.)

A frequent visitor on its way south, but rarely seen on its northward journey; most numerous in October. Nine couple were killed in Pembroke Marsh after the gale of the 22d October, 1854, and many more at St. David's Island, where a native sportsman is said to have killed sixteen couple during the gale (Hurdis). I obtained several specimens in October and November, 1874, and saw two, one of which I knocked down, but unfortunately lost, in the mangrove swamp near the Sluice-gates, on April 30, 1875.

Genus SPATULA, Boie.

149. *Spatula clypeata*, (Linn.) Boie. Shoveller.

Anas clypeata, Linn., Scop., Gm., Lath., Ill., Pall., Vieil., Brehm, Licht., Wils., Temm., Bp., and of earlier authors generally.

Spatula clypeata, Boie, Gray, Cass., Bd., Sel., Cab., Coop. & Suck., Hayd., Lawr., Coues, and most late writers.

Spathulea clypeata, Flem.

Rhynchaspis clypeata, Leach., Steph., Sp.

Anas rubens, Gm., Lath.

Length, 20; wing, 9.50; tarsus, 1.38.

Hab.—North America, Europe, Asia, Australia, southward to Guatemala, Cuba, Jamaica, Mexico. (Coues.)

"A single female specimen was shot in December, 1844, by Mr. C. B. Fozard" (Nat. in B., p. 47).

Genus AIX, Boie.

150. *Aix sponsa*, (Linn.) Boie. Wood Duck; Summer Duck.

Anas sponsa, Linn., Gm., Lath., Wils., Vieil., Licht., Steph., Bp., Nutt., Aud., Vig., Gir., Keys. & Blas., De Kay, Maxim.

Aix sponsa, Boie, Eyt., Bp., Gray, Gosse, Cab., Bd., Coop. & Suck., Verr., Coues, Hayd., Dress., and most late writers.

Dendronessa sponsa, Sw. & Rich.

Lampronessa sponsa, Wagl.

Cosmonessa sponsa, Reich.

Length, 19; wing, 9.50; tarsus, 1.40.

Hab.—North America, especially United States; breeding throughout in suitable places, and wintering chiefly in the south; Cuba (Coues).

“A female bird of this species was shot by Dr. Cole, Twentieth Regiment, on the 16th December, 1846” (Nat. in B., p. 48).

Sub-family FULIGULINÆ.

Genus FULIGULA, Steph.

151. *Fuligula affinis*, Eyt. Lesser Scaup Duck; Blue-bill.

Anas marila, Forst.

Fuligula marila, And.

Fuligula affinis, Eyt., Gosse, Turnb., Coues.

Marila affinis, Bp.

Fulix affinis, Bd., Schl., Lawr., Dress., Salv., Newton, Dall & Bann., Coues & Prent., Verr., Coues, Mayn., Aiken.

Fuligula mariloides, Vig.

Fuligula minor, Gir., Bell.

Length, 16.50; wing, 8; tarsus, 1.34.

Hab.—The whole of North America, and south to Guatemala in winter; part of the West Indies (Coues).

To make matters clear, in treating of this species, I must call in the aid of Dr. Coues, who says, in his “Birds of the Northwest” (p. 574): “Authors are at variance concerning the relationship of the bird to the preceding (*F. marila*), and the question is not yet settled. For myself I am rather inclined to keep the two apart, notwithstanding their very close resemblance, and admitting the probability that intermediate examples may be found. There appears to be something different in their range, the *F. affinis* being the more southerly. Not that it does not in the breeding season reach as high latitudes as the other, but that its autumnal movement is pushed to the West Indies and Central America, where the true *F. marila* is not recorded as occurring. It is improbable that two varieties, if they be really such, should preserve this difference.” Armed with this authority, I think I may safely refer the specimens of the Scaup chronicled in “The Naturalist in Bermuda,” all of which measured only 16 to 16½ inches in length, to this smaller species, *F. affinis*. The length of *F. marila* varies from 19 to 20½ inches. The specimens alluded to are one killed by Mr. C. Abbott, Twentieth Regiment, on the 19th December, 1846, and two others by Colonel Wedderburn, at Warwick Pond, on the 8th January, 1849. Lieutenant Denison, Royal Engineers, shot a female specimen at Tucker’s Town on the 25th February, 1876, measuring 16 inches in length.

152. *Fuligula collaris*, (Don.) Bp. Ring-necked Duck.*Anas collaris*, Donovan.*Fuligula collaris*, Bp., Gray, Blas., Schl., Degl., Gerbe, Turnb., Coues.*Fulix collaris*, Bd., Bryant, Verr., Coues, Salv., Dress., Gundl., Aiken, Trippe, Snow, and of most United States writers.*Marila collaris*, Bp.*Anas fuligula*, Wils., Temm.*Anas* (*Fuligula*) *rufitorques*, Bp.*Anas rufitorques*, Ord, Schl.*Fuligula rufitorques*, Bp., Sw. & Rich., Nutt., Aud., Eyt., Gir., De Kay, Gosse, Cass., Maxim.

Length, 18; wing, 8; tarsus, 1.28.

Hab.—The whole of North America, breeding far north, wintering in United States and beyond; south to Guatemala; Cuba; Jamaica; accidental in Europe (Coues).

One was captured, and kept for a short time alive, by Mr. Hurdis, on the 13th November, 1850. He was anxious to watch the change of the plumage, but the poor bird fell a victim to a cat (Nat. in B., p. 50).

Genus *AYTHYA*, Boie.153. *Aythya vallisneria*, (Wils.) Boie. Canvas-back Duck.*Anas vallisneria*, Wils., Dought.*Fuligula vallisneria*, Steph., Bp., Sw. & Rich., Nutt., Eyt., Aud., Gir., De Kay, Coues.*Aythya vallisneria*, Boie, Bp., Newb., Bd., Coop. & Suck., Dress., Salv., Dall & Bann., and most late writers.*Nyroca vallisneria*, Gray, Woodh., Heerm.*Aristonetta vallisneria*, Bd.*Anas vallisneriana*, Sab.

Length, 20.10; wing, 9.30; tarsus, 1.70.

Hab.—Whole of North America; breeds from Northern States northward; winters from Middle States southward to Guatemala (Coues).

Mr. Hurdis purchased a specimen of this Duck from some boys, by whom it was captured alive in a marsh near James's Cottages, on the 30th October, 1851. It was destroyed by ants soon afterwards. On the 23d November following he observed a very fine specimen in White's Marsh.

Genus *CLANGULA*, Flem.154. *Clangula glaucion*, Brehm. Golden-eye.*Anas clangula*, Linn., Scop., Forst., Gm., Lath., Ill., Wils., Temm., Leach., Vieil., Naum., Schl., Swinh.*Clangula clangula*, Boie.*Glaucion clangula*, Kaup, Keys. & Blas.*Fuligula clangula*, Bp., Nutt., Aud., Gir., Degl., Maxim., Finsch.*Bucephala clangula*, Coues.

Anas glaucion, Linn., Gm., Lath.

Clangula glaucion, C. L. Brehm, Bp., Gray.

Clangula vulgaris, Flem., Sw. & Rich., Sw., Eyt.

Clangula americana, Bp., Eyt., Gray, Newb.

Bucephala americana, Bd., Coop. & Suck., Verr., Coues, Blak.

Length, 18.75; wing, 8.50; tarsus, 1.50.

Hab.—Whole of North America, Cuba, Europe (Coues); Northern Asia (Dresser).

“A male specimen was shot on the 10th April, 1854, in Pembroke Marshes” (Nat. in B., p. 49). There were several of these Ducks about the islands in the winter of 1874–’75, and I succeeded in obtaining two, both males, in immature plumage, at Peniston’s Pond, on the 29th December, 1874, and 5th February following. A flock of seven frequented Shelly Bay Marsh, and were also seen by Lieutenant Hussey in the Great Sound, but I am not sure that any other specimens were procured. Lieutenant Denison records one shot in Devonshire Swamp on 22d January, 1876.

155. *Clangula albeola*, (Linn.) Steph. Buffle-head; Butter-ball.

Anas albeola, Linn., Forst., Gm., Lath., Wils., Schl.

Fuligula albeola, Bp., Nutt., Aud., Gir., De Kay, Schl.

Clangula albeola, Steph., Boie, Sw. & Rich., Jen., Eyt., Bp., Vig., Gray, Bd., Heerm., Reinh., Newton, Hart.

Bucephala albeola, Bd., Coop. & Suck., Dress., Coues, Dall & Bann., Aiken, Coues, and most late writers.

Anas bucephala, Linn., Gm.

Anas rustica, Linn., Gm.

Length, 15; wing, 6.65; tarsus, 1.25.

Hab.—North America; Mexico; Cuba; Greenland; accidental in England (Coues).

One was obtained in Pembroke Marsh in December, 1845, and others have been occasionally observed subsequently. A male was shot by Lieutenant Tallents, Twentieth Regiment, at Peniston’s Pond in November, 1875 (Denison).

Genus *ÆDEMIA*, Flem.

156. *Ædemia perspicillata*, (Linn.) Steph. Surf-Scoter.

Anas perspicillata, Linn., Forst., Gm., Lath., Wils., Temm., Vieil., Naum., Schl.

Oidemia perspicillata, Steph., Flem., Sw. & Rich., Gm., Sw., Bp., Keys. & Blas., Gray, Gosse, Cass., Reinh., Newton, Coues, Hart.

Pelionetta perspicillata, Kaup, Reich, Bp., Bd., Coop. & Suck., Coues, Verr., Blak., Lawr., Dall & Bann.

Fuligula perspicillata, Aud., De Kay, Gir., Degl.

Length, about 20; wing, 9.50; tail, 3.6; tarsus, 1.8.

Hab.—North America, coastwise; Jamaica; Europe, rare (Coues).

Two recorded in "The Naturalist in Bermuda"—one killed with a stick in Hamilton Harbor on the 8th January, 1849, and another shot in Pembroke Marsh on the 7th October, 1854. Lieutenant Hussey, Royal Engineers, shot one (a female) on a small pond near the light-house, on the 17th November, 1874, and kindly presented it to me.

Sub-family ERISMATURINÆ.

Genus ERISMATURA, Bp.

157. *Erismatura rubida*, (Wils.) Bp. Ruddy Duck.

Anas rubida, Wils., Sab.

Anas (*Fuligula*) *rubida*, Bp.

Fuligula (*Oxyura*) *rubida*, Bp.

Fuligula (*Gymnura*) *rubida*, Nutt.

Fuligula rubida, Sw. & Rich., Aud., Gir., De Kay, Lemb.

Erismatura rubida, Bp., Eyt., Gray, Bd., Sel., Heerm., Verr., Coues, Gundl., Stev.

Biziura rubida, Schl., Giebel.

Anas jamaicensis, Ord.

Length, 16.00; wing, 5.80; tarsus, 1.26.

Hab.—North America, at large; south to Guatemala, where found breeding at Dueñas; Cuba (Coues).

A young male of this species was shot by Dr. Cole, in a marsh near Hamilton, on the 24th November, 1846.

Sub-family MERGINÆ.

Genus MERGUS, Linn.

158. *Mergus merganser*, Linn. Goosander.

Mergus merganser, Linn., Gm., Lath., Wils., Temm., Bp., Flem., Jen., Sw. & Rich., Nutt., Aud., Gir., Naum., Schl., and authors generally.

Mergus castor, Linn., Gm., Lath., Keys. & Blas., Gray.

Merganser castor, Bp., Macgill.

Merganser castor var. *americanus*, Bp.

Merganser raii, Leach.

Merganser gulo, Steph., Leach.

Mergus americanus, Cass., Bd., Coop. & Suck., Hayd., Dall, Dall & Bann, Snow, Finsch, and of many late United States writers.

Length, 26.50; wing, 11.00; tarsus, 1.84.

Hab.—North America; Asia; Europe (Coues).

Included in Colonel Wedderburn's list as having been seen, but not obtained.

159. *Mergus serrator*, Linn. Red-breasted Merganser.

Mergus serrator, Linn., Gm., Lath., Pall., Ill., Wils., Temm., Boie, Licht., Brehm, Bp., Flem., Sw. & Rich., Nutt., Aud., Keys. & Blas., Naum., Gray, Schl., and nearly all authors.

Merganser serrator, Vieil., Steph., Bp.

Mergus niger, Gm.

Mergus cristatus, Brunn.

Mergus leucomelas, Brehm.

Length, 23.25 ; wing, 8.60 ; tarsus, 1.80.

Hab.—Northern hemisphere (Coues).

Mr. Bartram has an undoubted specimen, obtained by him near St. George's.

160. *Mergus cucullatus*, Linn. Hooded Merganser.

Mergus cucullatus, Linn., Gm., Lath., Bp., Sw. & Rich., Nutt., Jen., Aud., Eyt., Keys. & Blas., Temm., Gray, Schl., Gir., Cass., Sel., Coues.

Merganser cucullatus, Steph., Bp., Macgill.

Lophodytes cucullatus, Reich., Bp., Bd., Sel., Coop. & Suck., Verr., Coues, Gundl., Dress., Dall & Bann., Allen, and of many writers.

Length, 17.50 ; wing, 7.90 ; tarsus, 1.20.

Hab.—Whole of North America ; Europe ; Cuba (Coues).

A female was caught near Ireland Island by one of the crew of H. M. S. Scourge, on the 10th of January, 1849, and one was shot near St. George's on the 23d December, 1850. A third example was obtained by Mr. Bartram, and is now in his collection.

Order STEGANOPODES.

Family SULIDÆ.

Genus SULA, Briss.

161. *Sula fiber*, Linn. Booby Gannet.

Pelecanus fiber, Linn.

Pelecanus sula, Linn.

Dysporus sula, Ill., Bp.

Sula brasiliensis, Spix.

Sula fusca, Vieil., Bp., Nutt., Aud.

Length, 31.00 ; wing, 16.50 ; tarsus, 1.70 ; tail, 8.50.

Hab.—Gulf of Mexico ; Atlantic coast from Georgia southward (Baird).

Colonel Wedderburn records the occurrence of one of these birds, which flew into one of the barrack-rooms at Fort Catherine on October 3, 1847. Another, in Mr. Bartram's collection, was shot by an officer with a revolver, curiously enough, very near the same fort, and a young bird in Lieutenant Denison's collection was caught alive on the rocks near Fort Cunningham (at no great distance from Fort Catherine) on the 26th September, 1875, living for a short time in confinement.

Family PELECANIDÆ.

Genus PELECANUS, Linn.

162. *Pelecanus fuscus*, Linn. Brown Pelican.*Pelecanus fuscus*, Linn., Bp., Nutt., Aud.*Leptopelicanus fuscus*, Reich.*Onocrotalus fuscus*, Bp.

Length, 56; wing, 22; bill, 13.50; tarsus, 3; tail, 6.50.

Hab.—From Texas to North Carolina; California coast (Baird).

Two examples are recorded by Colonel Wedderburn, who says (Nat. in B., p. 51): "One of these birds was shot at Hungry Bay, many years ago; and another was killed near St. George's in April, 1850, which was given to me by Colonel Drummond."

Family PHALACROCORACIDÆ.

Genus GRACULUS, Linn.

163. *Graculus dilophus*, (Sw.) Gray. Double-crested Cormorant.*Pelecanus (Carbo) dilophus*, Sw. & Rich.*Carbo dilophus*, Gamb.*Phalacrocorax dilophus*, Nutt., Bp., Aud., Gir., Bd.*Graculus dilophus*, Gray, Bp., Bd., Coop. & Suck., Coues, Allen, Verr., Lawr., Dall & Bann., Ridg.*Phalacrocorax floridanus*, Maxim.

Length, 33; wing, 13; tail, 6.75; bill, 2.85; tarsus, 3.50.

Hab.—North America at large, in the interior as well as coastwise (Coues).

Three instances of the occurrence of this species are recorded in "The Naturalist in Bermuda," viz, one shot by Captain Orde, at Pitt's Bay, on the 10th October, 1847; one by Colonel Wedderburn, on Grace's Island, on the 8th February, 1848; and another, mentioned by Mr. Hurdis, which frequented the islands for some little time, but was not obtained. There is a specimen in Mr. Bartram's collection, and another in that of Mr. Lane, of Hamilton. There were several of these birds about the islands in the winter of 1874-'5, but they were so wary that none were obtained. One was repeatedly seen, and once fired at, in the Great Sound; one attached itself to St. George's Harbor; and a pair frequented the "Stag" Rocks, near Shelly Bay, all the winter, conspicuous to the passers-by as they sat in solemn security on their accustomed pinnacle. I tried in vain to obtain one of these, but never got a shot. One of them flew close over my head one morning, but I had not my

gun in my hand at the moment. One was shot, as recorded by Lieutenant Denison, Royal Engineers, at Basden's Pond, in the autumn of 1875.

Family TACHYPETIDÆ.

Genus TACHYPETES, Vieil.

164. *Tachypetes aquilus*, Vieil. Frigate Bird; Man-of-War Bird.

Tachypetes aquilus, Vieil., Bp.

Pelecanus aquilus, Linn., Nutt., Aud., Gamb.

Attagen aquila, Gray.

Length, 41; wing, 25; bill, 5.50; tail, 18; tarsus, .8.

Hab.—Texas to Florida; California (Baird).

Two were obtained at Ireland Island, on the 27th and 30th September, 1848, respectively, by Colonel Wedderburn. One was shot by Captain Clutterbuck, of the fifty-sixth regiment, on September 30, 1852, and another by Captain Tolcher, of the same regiment, on April 2, 1854. Mr. Bartram has three specimens in his collection, obtained by himself. The latest of these he shot in October, 1876, when there was a very strong gale from the northwest, lasting some days, and a great influx of Terns, Frigate-Birds, Ospreys, &c.

Family PHAËTONIDÆ.

Genus PHAËTON, Linn.

165. *Phaëton flavirostris*, Brandt. Yellow-billed Tropic Bird.

Lepturus candidus, Briss., Bp.

Phaëton candidus, Gray.

Phaëton æthereus, Bp., Nutt., Aud.

Phaëton flavirostris, Brandt, Sel.

Length, 30; wing, 11; tail, 18.50; bill, 2.05; tarsus, .9.

Hab.—Florida coast (Baird); Cuba; Bermuda.

The geographical distribution of the three known species of Tropic-bird, *P. æthereus*, *P. flavirostris*, and *P. rubricauda*, seems not yet well defined, and no doubt their extensive wanderings will render any attempt at precise limitation extremely difficult, certainly until we are in possession of a larger series of observations than at present. *P. flavirostris* (the "Boatswain-bird" or "Long-tail" of the Bermudas) is a familiar and abundant summer visitor to the islands, arriving at the end of February or beginning of March, and departing early in October. An occasional straggler is said to have been seen in Bermudian waters in winter time, presumably an early arrival, or backward young bird

left behind. One was shot as far north as the coast of Nova Scotia, after a violent gale from the south, on the 4th September, 1870. I saw this bird in the Halifax Museum. The excellent accounts of the habits and nidification of this species given by Mr. Hurdis and Colonel Wedderburn have left me but little to say. The single egg, which in coloring is not unlike that of a Kestrel, is deposited in holes in the rocks, always in those which have a flooring of sand, preference being given to steep and overhanging cliffs on the south shore and the islands about Castle Harbor. A few pairs nest on the northern shore, where the cliffs are much lower. Sometimes one can see the sitting bird's long tail-feathers protruding from the nest; while in another case the nest may be so far in, horizontally, that one can only tell there is one by the harsh grating cry of the disturbed occupant. Both male and female sit, fighting vigorously with their formidable bills in defense of their home. The young also show fight; in fact, the species is peculiarly fierce and untamable. Three young ones I kept alive for about two months maintained their savage nature till the last, refusing to feed themselves, striking viciously at any one who approached them, and even at one another. Their flight is peculiar, but graceful, and they never seem tired of their perpetual wheeling and maneuvering. They take beautiful headers, like a Tern or Gannet, in pursuit of small fish. It is rare to meet with a specimen possessing two good long central tail-feathers; one is generally smaller and shorter than the other. Some of these feathers are of a lovely orange-pink. They get rubbed off during incubation, and may be picked up near the breeding places. Two broods are reared, fresh eggs being found as early as the 10th April, and again at the end of June; there are intermediate examples, probably laid by birds whose first nests have been visited by the spoiler. That these birds revisit their breeding stations year after year is, I think, clearly shown by the following circumstance: Mr. Bartram, by way of experiment, slit the two webs of one foot, and cut off one or two claws, of a young bird in a nest near his house. Next year this bird turned up again, and made its nest close to the same spot. This attachment to the family residence is, I fancy, far from unusual with migratory birds. Swallows and other familiar visitors to England are known to possess it in a marked degree. On a calm day the bright greenish blue tint of the Atlantic waters, as they gently rise and fall above the white sands below, is reflected on the glossy white breasts and under parts of the Tropic-birds in a most remarkable manner as

they cruise about, at no great height, along the shores or among the islands. During the breeding season the parent birds "off duty" are to be seen in the neighborhood of their nesting places all the morning till about noon, when the greater part disappear in a rather mysterious manner. I came to the conclusion that they proceed to a considerable distance out to sea, returning at dusk, and this opinion was much strengthened by seeing two old birds sitting on the water one afternoon, at least 100 miles from the Bermuda shores. This was during a voyage from Bermuda to New York, on the 7th August, 1874, when the second "young hopeful" had probably left, or was about to leave, the nest, and therefore does not prove much; but it shows that these strong-winged birds, who would probably do their 100 miles in three hours, or even less, *do* travel to such distances from land long before they have thought of quitting their breeding haunts. In Castle Harbor, where there are a great number of Tropic-birds continually on the wing, and where they are left comparatively undisturbed during the daytime, this disappearance is, or appears to be, on a somewhat smaller scale.

Order LONGIPENNES.

Family LARIDÆ.

Sub-family LARINÆ.

Genus LARUS, Linn.

166. *Larus marinus*, Linn. Great Black-backed Gull.

Larus marinus, Linn., Gm., Lath., Temm., Boie, Steph., Flem., Bp., Nutt, Brehm., Jen., Eyt., Aud., Naum., Keys. & Blas., Schl., Gray, Lawr., Coues., Verr., and of other authors.

Dominicanus marinus, Bruch, Bp.

Larus niger, Briss.

Larus naevius, Linn., Gm., Lath.

Larus albus, Müll.

Larus maculatus, Bodd.

Larus maximus, Leach, Brehm.

Length, 30; wing, 18.50; bill, 2.50; tarsus, 3.

Hab.—American and European coasts of the Atlantic; south in winter to Long Island, Great Lakes, and Mississippi (Coues).

Mr. Hurdis mentions an immature example of this Gull, which was captured alive in the Great Sound in December, 1851, and Mr. Bartram has a fine specimen, also in immature plumage, shot by himself near Stocks Point, on the 27th December, 1862.

167. *Larus argentatus*, Gm. Herring Gull.*Larus fuscus*, Penn., Mont.*Larus argentatus*, Gm., Schl., Gundl., Hartl., Dress., Coues.*Larus marinus*, var. β , Lath.*Larus glaucus*, Retz., Meyer & W.*Larus cinereus*, Leach.*Larus argentatoides*, Brehm.*Larus argenteus*, Macgill.*Laroides major*, *argentatus*, *argenteus*, *argentatoides* et *argentaceus*, Brehm.*Glaucus argentatus*, *argentatoides*, Bruch.*Larus marinus*, Gundl., Lemb.*Larus smithsonianus*, Coues.Length, 23; wing, 18; tail, 7.50; bill, $2\frac{1}{2}$; tarsus, $2\frac{1}{2}$.

Hab.—Northwest Europe; Baltic; western coasts down to North Africa; Azores; Madeira; Canaries; Greenland; Hudson's Bay; Labrador; down the coast as far as Texas; Cuba; Bermuda. (Saunders.)

These Gulls occur frequently, not regularly, and many specimens have been obtained. One in my collection was shot in Devonshire Bay on the 4th November, and they have been seen as late as the 19th March. They were numerous in the autumn of 1875, and Lieutenant Denison obtained several specimens, all immature.

Larus occidentalis, Aud., has been included in the Bermuda lists by Colonel Wedderburn (Nat. in B., p. 54), but I think the geographical distribution of this species [Pacific Coast of North America (Saunders), (Coues)] precludes all possibility of its having occurred in the islands.

168. *Larus delawarensis*, Ord. Ring-billed Gull.*Larus delawarensis*, Ord, Lawr., Coop. & Suck., Coues, Verr., Schl., Allen.*Larus canus*, Bp., not of authors.*Larus zonorhynchus*, Rich., Nutt., Aud., Gir., Bp., Blas.*Glaucus zonorhynchus*, Bruch.*Gavina zonorhyncha*, Bp., Bruch.*Gavina bruchii*, Bp., Bruch.

Length, 19.75; wing, 14.75; bill, 1.70; tarsus, 2.05.

Hab.—North America; generally throughout the interior as well as coastwise; Cuba (Coues).

Only one on record killed by Colonel Wedderburn, near the Dock-yard, on the 1st January, 1849, during a northwesterly gale.

169. *Larus atricilla*, Linn. Laughing Gull.*Larus atricilla*, Linn., Temm., Steph., Flem., Bp., Nutt., Gm., Aud., Keys. & Blas., Gir., Schl., Gray, Pelz., Sund., Sel. & Salv., Coues.*Xema atricilla*, Boie, Bp., Cab.*Gavia atricilla*, Macgill., Blas.*Chroicocephalus atricilla*, Lawr., Sel., Newton, Bryant, Coues, Verr., Allen, Dress., Gundl.*Larus ridibundus*, Wils., Léot.*Atricilla catesbyi*, Bruch.

Length, 16.50; wing, 13; tail, about 5; bill, 1.75; tarsus, 2.

Hab.—America, from Maine on the east coast down to the mouth of the Amazons and the West Indian Islands; on the west coast, California, Mexico, Guatemala, and as far south as the northern frontier of Peru. (Saunders.)

One seen, flying close past him, by Colonel Wedderburn, at Ireland Island. Mr. Hurdis records that one was taken alive by a fisherman in the winter of 1851-'52, and was confined for some time in a spare room, eventually effecting its escape.

170. *Larus philadelphia*, (Ord.) Gray. Bonaparte's Gull.

Sterna philadelphia, Ord.

Chrococephalus philadelphia, Lawr., Coop. & Suck., Coues, Verr., Allen, Dall & Bann., Mayn., Newt.

Larus philadelphia, Gray, Hart., Coues, Ridg., Saunders.

Larus philadelphicus, Turnb.

Larus capistratus, Bp.

Larus bonapartei, Rich., Nutt., Aud., Jerd., Schl.

Xema bonapartei, Bp.

Chroicocephalus bonapartei, Bruch.

Gavia bonapartei, Bp., Blas.

Length, 14; wing, 10.25; bill, 1.20; tarsus, 1.40.

Hab.—British North America and Alaska; breeding on the Yukon, and in neighboring localities. In autumn descends as far as California on the west and North Carolina on the east coast; Bermuda. Accidental in the British Islands. (Saunders.)

Three are recorded by Colonel Wedderburn. One was shot by himself on the 27th January, 1849; a second was seen by him on the 15th December, 1849; and another was killed on the 24th February, 1850. Mr. Bartram obtained two specimens in St. George's Harbor in January, 1876.

Genus *RISSA*, Leach.

171. *Rissa tridactyla*, (Linn.) Bp. Kittiwake.

Larus rissa, Linn., Gm., Leach, Flem.

Laroides rissa, Brehm.

Larus riga, Gm., Less.

Larus tridactylus, Linn., Gm., Lath., Retz., Nils., Mey. & Wolf, Temm., Vieil., Brehm., Bp., Sw. & Rich., Nutt., Aud., Naum., Keys. & Blas., Schl., Gir., Coues.

Gavia tridactyla, Boie.

Cheimonca tridactyla, Kaup.

Laroides tridactyla, Brehm.

Rissa tridactyla, Bp., Gray, Bruch, Lawr., Coues, Ridg., Verr., Allen, Newt., Dall & Bann., Finsch, Blas., Saunders.

Larus naevius, Schaff.

Larus torquatus et *Larus gavia*, Pall.

Rissa brunnichii, Steph. ex Leach.

Rissa cinerea, Eyt.

Laroides minor, Brehm.

Rissa kotzebui, Bp.

Length, about 17; wing, 12.25; bill, 1.45; tarsus, 1.30.

Hab.—Arctic regions of both hemispheres, south in winter on the Atlantic coast to the Middle States. (Coues.)

I cannot do better than quote from Mr. Hurdiss' MS. notes, as follows: "There is no part of the world, perhaps, whose shores are so little frequented by Gulls and other sea-birds, as those of the islands of Bermuda.

"During the violent westerly gales of winter, the Kittiwake is probably seen there oftener than any other species, being met with from the 5th January to the 4th April. About a dozen specimens came under my observation."

Most of the examples obtained are in immature plumage.

Genus XEMA, Leach.

172. *Xema sabinii*, (Sabine) Leach. Sabine's Gull; Fork-tailed Gull.

Larus sabinii, Sab., Gm., Wils., Sw. & Rich., Nutt., Aud., Keys. & Blas., Temm., Naum., Schl., Degl., Hart.

Xema sabinii, Leach, Eyt., Bp., Gray, Bruch, Blas., Lawr., Newton, Coues, Dall & Bann., Allen, Saunders.

Gavia sabini, Macgil.

Length, 13.75; wing, 10.75; bill, 1; tarsus, 1.25.

Hab.—Arctic regions of both hemispheres; Spitzbergen; in America, south in winter to New York, and Great Salt Lake, Utah. (Coues.)

Colonel Wedderburn says: "A single specimen was shot by Colonel Drummond, near Saint George's, but the date I do not recollect."

Sub-family STERNINÆ.

Genus STERNA, Linn.

173. *Sterna anglica*, Mont. Gull-billed Tern.

Sterna anglica, Mont., Leach, Temm., Flem., Nutt., Aud., Gir., Schl., Gray, Degl., Maxim., Coues, Ridg., Saunders.

Thalasseus anglicus, Boie.

Viralva anglica, Steph.

Laropsis anglica, Wagl.

Gelochelidon anglica, Bp., Boie., Coues, Salv.

Sterna aranea, Wils., Vieil., Bp., Lawr., Coues & Prent., Allen, Dress.

Gelochelidon aranea, Bp.

Sterna macrotarsa, Gould.

Sterna affinis, Horsf.

Gelochelidon palustris, Macgil.

Gelochelidon balthica, *agraria*, *meridionalis*, Brehm.

Length, 13 to 14.50; wing, 11.75 to 12.25; tail, 5.60; bill, 1.40; tarsus, 1.30.

Hab.—Nearly cosmopolitan. In North America, chiefly Eastern United States; not detected on the Pacific side; Patagonia. (Coues).

One only has occurred, taken alive in the Royal Engineer workshops at Boaz Island, on the 29th April, 1875. This bird, which proved to be a female, lived only a short time. It is now in Lieutenant Dennison's collection.

174. *Sterna fluviatilis*, Naum. Common Tern.

Sterna hirundo, Linn, (in part), and most authors.

Larus bicolor, *sterna*, *columbinus*, Scop.

Sterna fluviatilis, Naum., Gray, Sharpe & Dresser.

Sterna senegalensis, Sw., Schl.

Sterna wilsonii, Bp., Gray.

Sterna macrodactyla, et *macroptera*, Blas., Gray.

Sterna dongalli, Layard.

Length, 14.50; wing, 10.50; tail, 6; bill, 1.35; tarsus, 0.80 to 0.85.

Hab.—Throughout temperate Europe, Asia, and America, except Pacific coast. In winter visits Cape of Good Hope. Has been found as far to the southeast as Ceylon, northward as far as Pekin. (Saunders.)

These Terns used to visit Bermuda annually and breed in considerable numbers on Gurnet Head Rock and other small islands at the eastern end of the group, but they have now given up their former breeding places and are only occasionally seen in the autumn or winter months, sometimes in considerable numbers. Doubtless the increase in the population of the islands and the continual plundering of their nests have driven them away. They were sufficiently numerous in 1850, but there is no record of their having bred since that date. In 1854 many appeared in Hamilton Harbor (Hurdis), and in October, 1876, during a strong northwest gale, St. George's Harbor was alive with Terns, Mr. Bartram obtaining specimens of the common and black kinds. Not a single Tern of any species, to my knowledge, was seen in the autumn of 1874 and winter following.

175. *Sterna dougalli*, Mont. Roseate Tern.

Sterna paradisea, Keys. & Blas., Schl., Degl., Gray, Bp., Lawr., Coues, Salv., Gundl., Allen, Mayn.

Sterna dougalli, Mont., Leach, Vieil., Temm., Boie, Steph., Flem., Brehm., Nutt., Gm., Eyt., Bp., Aud., Naum., Gir., Cab., Sl. & Salv., Saunders.

Sterna macdougalli, Macgil.

Sterna douglasi, Blas.

Sterna gracilis, Gould.

Length, 14 to 15; wing, 9.25 to 9.75; tail, 7.50; bill, 1.50; tarsus, 0.85.

Hab.—Europe. In North America, from Massachusetts to Florida, thence to Central America. Various West Indian Islands. No United

States record of wintering (Coues). Cape of Good Hope, Natal, Andaman Islands, Ceylon, Malayan Islands, west coast of Australia. (Saunders.)

The same remarks apply, unfortunately, to this species as to the preceding, it being no longer found, except, perhaps, as an autumn straggler, in the islands. At one time it used to breed in considerable numbers on Gurnet Head Rock (sometimes called the Black Rock). Mr. Hurdis says: "On this rock, difficult of access on account of the ocean swell, as many as 40 or 50 of this elegant species of Tern have been observed in the middle of June, and from the circumstance of both eggs and young having been obtained there on the 1st August, I conclude that it must rear two broods in the season."

Both species were called "Redshanks" by the Bermudians.

176. *Sterna fuliginosa*, Gm. Sooty Tern.

Sterna fuliginosa, Gm., Lath., Wils., Bp., Nutt., Aud., Cab., Lawr., Hartl., Dress., Sund., Hart., Saunders.

Sterna (Onychoprion) fuliginosa, Gray.

Sterna (Haliplanes) fuliginosa, Blas.

Sterna (Haliplana) fuliginosa, Coues.

Onychoprion fuliginosa, Wagl., Gould, ScL., ScL. & Salv.

Haliplana fuliginosa, Wagl., Bp., Coues, Salv., Gundl., Lawr., Allen.

Sterna serrata, Forst.

Hydrochelidon fuliginosum, Bp., Gosse.

Sterna guttata, Forst.

Anous Therminieri, Less.

Sterna gouldii, Reich.

Sterna luctuosa, Phil. & Laudb.

Thalassipora infuscata, Gray.

Sterna fuliginosa var. *crissalis*, Bd., apud Lawr.

Length, 16.50; wing, 12; tail, 7 to 7.50; bill, 1.80; tarsus, 1.

Hab.—Throughout the warmer portions of the world (Saunders).

Of rare occurrence. Colonel Wedderburn says: "Dr. Cole shot a specimen of this Tern in October, 1846. During the whole time I was quartered in Bermuda I only saw one of these birds, and that in the year 1848. I was walking on the sand-hills, and saw a bird apparently dead on the ground. I put down my gun, and picked the bird up, and was just putting him carefully in paper when my prize thought fit to come to life and flew away, taking me so much by surprise that I never thought of using my gun. It was a most beautiful specimen, and must have been driven on shore by some heavy gale." Mr. Hurdis records that a third example was found in an exhausted state in Devonshire parish, on the 23d October, 1854, after a severe gale the previous day. Lieutenant Denison, Royal Engineers, received a young male in curi-

ous plumage, caught near Paget Quarry, on the south shore, on the 19th September, 1875.

Genus HYDROCHELIDON, Boie.

177. *Hydrochelidon nigra*, (Linn.) Boie. Black Tern.

Sterna nigra, Linn., Mey. & Wolf, Temm.

Sterna nœvia, Linn.

Sterna fassipes, Linn., Schl.

Larus merulinus, Scop.

Sterna surinamensis, Gm.

Sterna plumbea, Wils.

Hydrochelidon nigra, Boie.

Viralva nigra, Steph.

Anous plumbea, Steph.

Hydrochelidon fassipes, Gray, Blas., Degl. & Gerbe, ScL. & Salv., Coues.

Hydrochelidon plumbea, Lawr. and other Am. authors.

Pelodes surinamensis, Gray.

Hydrochelidon lariformis, Coues.

"*Sterna cœsia*, Linn.," Gundl.

Length, 9.25; wing, 8.25; tail, 3.75; bill, 1.10; tarsus, .68.

Hab.—Europe, Palestine, and North Africa to the Nile. Across the continent of North America, visiting West Indies and Spanish Main on the one side, and going as far south as Peru and Chili on the Pacific coast in winter (Saunders).

Mr. Bartram obtained the only recorded example of this Tern in St. George's Harbor in October, 1876, after a severe gale from the north-west. It was in company with many other Terns of various species, but only one other, *S. fluviatilis*, was identified.

Genus ANOUS, Leach.

178. *Anous stolidus* (Linn.), Gray. Noddy Tern.

Sterna stolida, Linn., Gm., Lath., Less., Bp., Nutt., Aud., Schl., Hart., Maxim.

Megalopterus stolidus, Boie, Bp., Keys. & Blas.

Anous stolidus, Gray, Cab., Lawr., ScL., Coues, ScL. & Salv., Saunders.

Anous niger, Steph., Eyt.

Gavia leucocephala, Sw.

Sterna pileata, Scop.

Anas rousseaui, Hartl.

Anous fuscatulus et spadicea, Steph.

Length, 16; wing, 10 to 10.50; tail, 6; bill, 1.75; tarsus, 1.

Hab.—Ranges from the Gulf coast of North America to the shores of Australia, throughout Polynesia, and occurs in fact in all tropical waters. A straggler to the British seas (Saunders).

A solitary example was killed near Ireland Island by Captain Tolcher, Fifth-sixth Regiment, on the 12th September, 1854.

Family PROCELLARIIDÆ.

Sub-family PROCELLARIINÆ.

Genus OCEANITES, Keys. & Blas.

179. *Oceanites oceanicus**, Kuhl. Wilson's Petrel.*Procellaria pelagica*, Wils.*Procellaria oceanica*, Kuhl.*Procellaria wilsoni*, Bp.*Thalassidroma wilsoni*, Bp., Nutt., Aud.*Thalassidroma oceanica* (Kuhl.), Schinz.*Oceanites wilsoni* (Bp.), Keys. & Blas.*Oceanites oceanica* (Kuhl.), Bp.*Oceanites oceanicus* (Kuhl.), Salv.

Length, 7; wing, 5.75; tail, 3; tarsus, 1.3; bill, .65.

Hab.—On both sides of the Atlantic Ocean, and in the Indian Ocean, from the coasts of North America and those of the British Isles down to Kerguelen Land and South Australia, and is by no means uncommon on the ocean off the Azores. (Dresser.)

Colonel Wedderburn says: "I have often seen these birds flying about near the North Rock, and once or twice inside the outer reefs in stormy weather, but never succeeded in shooting any of them." One was shot by Mr. Harford, Fifty-sixth Regiment, some distance from the shore, on the 30th June, 1853. Mr. Bartram's collection contains a specimen, concerning which he writes as follows: "Wilson's Petrel is not such a *rara avis* around the islands as you may be led to think through reading the Naturalist in Bermuda. In May, June, and July there are numbers to be found around the fishing boats a mile or two outside the castle; some days there are ten or twelve flying round, other days none at all. The one that I have was caught by Mr. John Swainson, on St. Catherine's Flat; he was fishing and three or four were flying round the boat and he kept washing in bait; this one came so close that he grabbed it in his hand. At another time it was blowing a strong gale from the north-west, and I saw four so close up to the north shore that the boys threw stones at them. I could have shot them, but if I had I could not have got them." I am not aware that this species has ever been found breeding in Bermuda. I searched in vain for nests, but should not be surprised to hear of them being discovered there some day or other, as the sandy cliffs and débris on the south shore are most suitable for them.

* In a letter dated 9th December, 1878, Mr. Bartram informs me that twelve of these Petrels were seen flying about the inside of the Flats Harbor in the middle of October, 1878 (S. G. R.).

Genus PUFFINUS, Briss.

180. *Puffinus major*, Fab. Greater Shearwater.*Puffinus major*, Fab.*Puffinus cinereus*, Bp.*Nectris cinerea*, Keys. & Blas.*Cymotomus arcticus*, Macgil.*Puffinus arcticus*, Macgil.*Ardenna major* (Fab.), Reich.*Procellaria major* (Fab.), Schl.*Puffinus obscurus*, Hart.

Length, 19; wing, 12.16; tail, 4.7; tarsus, 2.38; bill, 2.35.

Hab.—Throughout the whole of the Atlantic Ocean, from the coasts of Greenland to the Cape of Good Hope and Tierra del Fuego (Dresser).

Two obtained by Mr. Hurdis, on the 2d June, 1851; one picked up, unable to fly, in the road on the south side of Hamilton Harbor, and another caught alive in the water near the town of Hamilton. The former measured 19.2 inches in length, with an expanse of wings of 44 inches; the latter was an exact duplicate of it, according to Mr. Hurdis; there is no doubt that the birds belonged to this species, and not to the following one.

181. *Puffinus griseus*, (Gm.) Finsch. Sooty Shearwater.*Nectris fuliginosa*, Solander.*Procellaria grisea*, Gm.*Procellaria fuliginosa*, Forst., Kuhl.*Puffinus fuliginosus*, Strick.*Puffinus cinereus*, Gould.*Nectris fuliginosa*, Keys. & Blas.*Puffinus major*, Temm.*Procellaria tristis*, Forst.*Puffinus tristis* (Forst.), Gray.*Nectris amaurosoma*, Coues.*Puffinus amaurosoma* (Coues), Gray.*Puffinus griseus* (Gm.), Finsch.

Length, 16; wing, 11.85; tail, 3.7; tarsus, 2.22.

Hab.—In the Atlantic from the coast of Greenland to the extreme south; in the Pacific from the coast of California down at least to Chili, and off the coast of New Zealand. (Dresser.)

One specimen in Mr. Bartram's collection obtained by himself.

182. *Puffinus anglorum*, Temm. Manx Shearwater.*Procellaria puffinus*, Linn.*Procellaria anglorum*, Temm.*Puffinus anglorum* (Temm.), Boie.*Puffinus arcticus*, Faber.*Procellaria yelkouan*, Acerbi.*Thalassidroma anglorum* (Temm.), Sw.

Bull. Nat. Mus. No. 25—18

Nectris puffinus (Linn.), Keys. & Blas.

Nectris obscura, Keys. & Blas.

Cymotomus anglorum (Temm.), Macgil.

Puffinus obscurus, Bp.

Puffinus barolli (Bonelli), Bp.

Puffinus yelkouan (Acerbi), Bp.

Procellaria yelkuan (Acerbi), Schl.

Puffinus yelcuanus (Acerbi), Coues.

Nectris anglorum (Temm.), Rey.

Nectris baroli, Rey.

Length, about 13; wing, 9.3; tail, 3.2; tarsus, 1.9; bill, 1.6.

Hab.—North Atlantic Ocean, not ranging into the Baltic, but in the Mediterranean as far as the Black Sea. On the American coast from Labrador down to New Jersey. (Dresser.)

A specimen in Mr. Bartram's collection, captured while sitting on its solitary egg in a rocky hole on a small island in Castle Harbor, in April, 1864. The egg was unfortunately broken. There is no record of the bird's breeding on any other occasion, nor of any other specimens being obtained; but it is quite possible that it, as well as Wilson's Petrel and other *Procellariidæ*, may formerly have frequented the islands in numbers, and that an occasional pair may revisit their old haunts. Such birds would, from their habits, be but little noticed by any but fishermen.

183. *Puffinus obscurus*, Gm. Dusky Shearwater; "Cahow;" "Pemblyco."

Procellaria obscura, Gm.

Puffinus obscurus, Lath., Bp., Nutt., Aud.

"*Puffinus lherminieri*, Less."

Length, about 12; wing, $7\frac{1}{2}$ to 8; tail, $4\frac{1}{4}$; bill, $1\frac{1}{4}$; tarsus, $1\frac{3}{8}$.

Hab.—Tropical regions in Atlantic and Pacific Oceans.

Since Mr. Hurdis, in 1849, identified the "Cahow" or "Cowhow" of the historians of Bermuda with this interesting species, very few observations have been made on the few pairs still frequenting the islands. That the poor "Cahow" has almost ceased to breed there is a melancholy fact. Formerly it was plentiful, and even within the last fifteen years, Mr. Bartram informs me, there were many nests in the isolated rocks, both on the north and south shores. On the north side the bird was formerly called "Pemblyco" or "Pimlico," probably from its call-note, while on the southern shores the name "Cahow" or "Cowhow" was applied to it. I found two nests in 1874, each containing a single young bird, one of which I kept alive for about six weeks, intending to send him to the Zoological Society's Gardens in London; but before I

got an opportunity of doing so the unfortunate bird died. He had become remarkably tame, following me about the house and garden, waddling along awkwardly enough on his tarsi, and uttering a musical "chirrup" the while. He used to sit under the table where I was writing, pecking away at my boots, and apparently extremely happy. I fed him on fish, and gave him a salt-water tub occasionally, which he thoroughly enjoyed. He slept a great deal during the day, and usually got behind an open door—the darkest place he could find—for his "siesta." When I took him from the nest he was nearly able to fly, but still retained the long nestling-down of the young bird, slate-colored on the head and shoulders, light brown on the under parts; the former soon rubbed off, but the latter was more permanent, and was not got rid of for some days. The nests were simple holes in the face of the rock—my bird had barely room to turn round in his. There was no unpleasant smell about the nests or young birds, the peculiar, and to me not disagreeable, odor of the Shearwater tribe being alone distinguishable by its presence. I saw nothing of the old birds, who were in all probability far out at sea at the time. An egg of this species, kindly presented to me by Mr. Bartram, is, of course, pure white; it has a considerable polish, and is about the size of a bantam's, but less elongated in form. Mr. Bartram was good enough also to present me with two skins of the adult bird. He tells me that the statement made by the old historians of Bermuda as to the capture of the "Cahow" at night is no exaggeration; for on visiting an island one night where there were several pairs breeding, he quickly caught half a dozen of them, the stupid things settling on his body as he lay on the ground, and allowing themselves to be taken in his hand! I know of only one instance of a "Cahow" being seen on the wing in the day-time in Bermudian waters: this was in August, 1874, when one was shot crossing Castle Harbor, by Lieutenant Hopegood, Ninety-seventh Regiment; but I believe they are occasionally observed by fishermen on the south side.

With reference to the local names "Cahow" or "Cowhow," and "Pemblyco" or "Pimlico," Mr. Bartram writes to me on the 19th July, 1878: "About twelve months ago I came across an old book called 'A Complete System of Geography,' printed under the name of Herman Moll, &c., September 21, 1747, and the greater part of it professedly taken from a much older work called 'Britannick in America.' After describing Bermuda and its animal, insect, and vegetable productions, it gives the following account of the birds that were found on the islands at that

time (say between 200 and 300 years ago): 'There was a great variety of fowl, both wild and tame, such as Hawks of all sorts, Storks, Herons, Bitterns, Ospreys, Cormorants, Bald-Coots, Moor-Hens, Swans, Teal, Snipes, Ducks, Widgeons, Sparrows, Woodpeckers, and a vast multitude and variety of the smaller kinds, besides Owls, Bats, and other nocturnal birds. Here was likewise formerly a kind of water-fowl, peculiar to those islands, which used to come to land and hatch its young in holes and burrows of the rock like rabbits. They were in great plenty, and were called Cow-koes. They were easily caught, and good to eat, the size of a Sea-mew. Our English made such havock among them they are become scarce. Here is likewise found the Tropic Bird and the "Pemlico." The last is seldom seen in the day-time, and, when it is, it is looked upon as the unwelcome harbinger of a storm.'

"Now my belief is that the Cow-koes of old are lost and gone long ago, and that the Cahow of the present day is neither more nor less than the old and ancient Pemlico. For, in the first place, the Cahow of this day is not nearly so big as a Sea-mew; secondly, the Pemlico has never been lost sight of by the Bermudians, the name having been handed down from father to son from the earliest times to the present day; and, thirdly, the habits of the old Pemlico and the Cahow of to-day correspond to a T—that is, they are seldom seen flying in the day-time, only at night."

Mr. Bartram goes on to say that on making inquiries of the people of Tucker's Town, St. David's, and Bailey's Bay, they knew nothing of the Cahow, but all could tell him of the Pemlico. From the above interesting account and from the strong evidence adduced by Mr. Bartram, I am inclined (with all due deference to Mr. Hurdis) to share his opinion as to the proper local name for *P. obscurus* being Pemblyco or Pemlico, and further to believe that the Cow-koes or Cahows of old were of a larger species, probably Manx Shearwaters (*P. anglorum*). This, after all, is pure conjecture and of doubtful interest to any but Bermudians themselves; still I venture to mention the facts in the hope that some more conclusive historical evidence may be forthcoming.

Puffinus opisthomelas (Coues): Black-vented Shearwater. On the 1st May, 1877, Mr. Bartram obtained a bird sitting on its egg on a rocky islet in Castle Harbor, which, from its measurements and admixture of black feathers with the white of the under tail-coverts, may be referable to the variety or species *P. opisthomelas*; though, as I know nothing of this bird and am ignorant of its synonymy, I have not thought it

advisable to introduce it formally into my list. Moreover, to judge from Dr. O. Finsch's remarks on *P. obscurus* in his paper on the Birds of Ninafou Island, in the Pacific (P. Z. S., 1877, Part IV, pp. 786, 787), it would appear "that the black or white of the under tail-feathers forms no specific character, and even less so the more or less extent of the black along the rectal line."

Mr. Bartram informs me "The Black-vented Shearwater is 15 inches long; wing, 9; tail, $3\frac{1}{2}$; bill, $1\frac{1}{2}$ (not measuring along the curve); tarsus, $1\frac{1}{2}$; middle toe and claw, $1\frac{3}{4}$; under parts white; upper parts black; tail black; sides of the cheek below the eyes black; crissum white, but a black bunch of feathers on each side, lapping over and meeting across the vent; in other respects it is made like the Cahow, only larger; it does not exactly answer to Coues' description, but the black below the eyes is the distinguishing mark, and being a female may account for the difference. The egg is white and measures $2\frac{3}{8}$ by $1\frac{1}{2}$ inches."

To judge from the size of the bird and its egg, I should myself be inclined to consider this specimen a Manx Shearwater (*P. anglorum*), which has been already shown to breed in Bermuda by Mr. Bartram, but I have no means of deciding the question, and am compelled to leave it in its present unsatisfactory state.

Order PYGOPODES.

Family PODICIPIDÆ.

Genus PODICEPS, Lath.

184. *Podiceps cornutus*, Lath. Horned Grebe.

Colymbus auritus, Linn.

Colymbus duplicatus, Müll.

Colymbus cornutus, Gm., Naum.

Podiceps cornutus, Lath., Temm., Boie, Steph., Keys. & Blas., Gray, Schl., Bp., Sw. & Reich., Nutt., Aud., Lawr., Coues, Finsch, Snow, and of authors generally.

Dytes cornutus, Kaup.

Colymbus obscurus, Gm.

Podiceps obscurus, Lath., Leach.

Colymbus caspicus, S. G. Gm., Gm.

Podiceps caspicus, Lath.

Colymbus nigricans, Scop.

Podiceps arcticus, Boie.

Podiceps sclavus, Bp.

Length, 14; wing, 5.75; tarsus, 1.75; bill, .90.

Hab.—North America; Europe; Asia. (Coues.)

One shot by Dr. Cole, on the 24th of November, 1846, is now in the

Rev. H. B. Tristram's collection. One was killed by Captain Tolcher, Fifty-sixth Regiment, near Spanish Point, on the 1st February, 1855; it was in company with three or four others. Mr. Bartram has two specimens of different dates.

Genus *PODILYMBUS*, Less.

185. *Podilymbus podiceps*, (Linn.) Lawr. Pied-billed Grebe; Water-witch; Dabchick.

Colymbus podiceps, Linn., Gm.

Podilymbus podiceps, Lawr., Coop. & Suck., Coues, and of most late U. S. writers.

Sylbeocyclus podiceps, Bp.

Colymbus ludovicianus, Gm.

Podiceps ludovicianus, Lath.

Podiceps carolinensis, Lath., Bp., Sw. & Reich., Nutt., Aud., Gir., Max., and of writers generally.

Sylbeocyclus carolinensis, Bp.

Podilymbus lineatus, Heerm.

Length, about 13; wing, 5; tarsus, 1.50; bill, .75.

Hab.—North, Central, and part of South America; West Indies (Coues).

Three are recorded in "The Naturalist in Bermuda"—two obtained in October, 1849, and one by Major Wedderburn, in February, 1850. Mr. Hurdis once found a perfect skeleton of this bird by the side of a pond. Tolerably abundant in the winter of 1874-'75, especially at Trott's and Basden's Ponds. The way in which these birds can sink under water, without leaving a ripple behind, is truly marvellous, and entitles them fully to the name "Water Witch." They are very shy, but I once surprised one asleep on a flat stone, as much to my astonishment as to the bird's. All the specimens I saw were in immature plumage, wanting the black bar on the bill and the black throat-patch.

Family *ALCIDÆ*.

Genus *MERGULUS*, Ray.

186. *Mergulus alle*, (Linn.) Vieil. Little Auk; Sea-Dove; Dovekie.

Alca alle, Linn.

Mergulus alle, Vieil., Aud.

Uria alle, Temm., Bp., Aud.

Mergulus melanoleucus, Ray.

Alca candida, Brunn.

Alca alce, Gm.

Length, $7\frac{1}{2}$; wing, $4\frac{1}{2}$; tail, $1\frac{1}{4}$.

Hab.—Circumpolar portion of both the Western Palæarctic and Eastern Nearctic Regions, being driven southward to continental Europe

and the coasts of the United States only by stress of weather; stragglers in some numbers as far south as the Canaries (Dresser).

Mr. Hurdis says: "One of these birds was captured alive on the 28th January, 1850, by a servant of the Rev. J. U. Campbell, at Ireland Island. It was in company with four or five others on a piece of grass-land near that gentleman's house. Unfortunately this specimen was destroyed by a pig before I had an opportunity of seeing it. My information was obtained from Mr. Campbell himself, who had this bird in his possession."

PART V.

ON A BIRD NEW TO BERMUDA,

WITH

NOTES UPON SEVERAL SPECIES OF RARE OR ACCIDENTAL OCCURRENCE.

BY

CLINTON HART MERRIAM, M. D.,
OF LOCUST GROVE, LEWIS COUNTY, NEW YORK.

ON A BIRD NEW TO THE BERMUDAS, WITH NOTES UPON SEVERAL SPECIES OF RARE OR ACCIDENTAL OCCURRENCE.

Melospiza fasciata (Gmelin) Scott. Song Sparrow.

Walter H. Merriam and myself found a dead Song Sparrow near Hungary Bay, Bermuda, April 18, 1881. This was after a heavy gale from the southwest, and the date would bring it about the close of the period of northward migration for this species along our coast. Although the weather was warm and the atmosphere laden with moisture the bird was perfectly fresh and could not have been dead long. It was doubtless lost at sea during the storm and carried exhausted to the Bermudas, where it perished from the effects of the tempest. This species has not heretofore been recorded from the Bermudas.

Pyrranga rubra (Linn.) Vieillot Scarlet Tanager.

On the 18th of April, 1881, I found an adult male of this species, washed ashore on the south side of Bermuda, in Paget Parish.

Pelionetta perspicillata (Linn.) Kaup. Surf Duck.

During the middle and latter part of April, 1881, I on several occasions saw a male "Skunk-head Scoter," or "Surf Duck" swimming about in a shallow brackish-water pond in Devonshire Parish. The pond was bordered and encroached upon by a dense growth of the curious semi-aquatic mangrove (*Rhizophora mangle*), of which a single tree often covers several acres, and constitutes a miniature forest by itself. It was within this intricate and complex labyrinth of half-immersed roots and tangled branches that the duck was commonly found. Here he would drift about lazily but with considerable circumspection, obtaining an easy and varied sustenance from the multitudes of small "shell fish" and other marine animals that gather in countless hosts about the roots of this remarkable tree. Where could a duck find a more inviting or secure home than this secluded lagoon, hidden by a dense and almost impenetrable jungle of mangrove, and surrounded by a morass of treacherous bog?

Cymochorea leucorrhoa (Vieillot) Coues. Leach's Petrel.

While gathering shells along the stretch of south shore known as "Tuckerstown Beach," May 1, 1881, Mr. Wm. S. Peniston and I found an adult female of this Petrel lying dead upon the sand. The bird is common enough at sea a hundred or two miles from the Bermudas, but I never saw one near the islands.

PART VI.

THE REPTILES OF BERMUDA.

BY

SAMUEL GARMAN,

OF THE MUSEUM OF COMPARATIVE ZOOLOGY, CAMBRIDGE.

THE REPTILES OF BERMUDA.

SAURIA.—Lizards.

EUMECES LONGIROSTRIS Cope.

TESTUDINATA.—Turtles.

SPHARGIS CORIACEA Gray. Leather Back.

CHELONIA MYDAS Schw. Green.

THALASSOCHELYS CAOUANA Fitz. Loggerhead.

ERETMOCHELYS IMBRICATA Fitz. Hawksbill.

Five species of reptiles are all that are known to be found on the Bermudas. Only one of the five, *Eumeces longirostris*,* can be claimed by these islands as their own. This one is a long-bodied, short-limbed, red-faced little scinc, which loves the sunshine so brilliantly reflected in the bronzed tint of the smooth glossy scales, which has colors so subdued

*EUMECES LONGIROSTRIS.

Plestiodon longirostris Cope, 1861, Pr. Ac. Phil., 313.

Eumeces longirostris Cope, 1875, Check List, 45.

Eumeces longirostris Goode, Am. Jour. Sci. 1877, 290.

Body moderately stout, fusiform, depressed; head little larger than the neck, swollen at the angle of the mouth, tapering to the narrow muzzle; tail about one-sixth longer than the body, stout, conical, tapering to a point. Limbs short, rather stout; anterior reaching the fourth labial, posterior—without the toes—extending half way to the axilla. Digits compressed, with strong curved nails. Eye small; lower lid with large scales in front of the pupil which are translucent, if not transparent. Mouth-cleft medium, curved. Snout elongate, slightly swollen near the end in large specimens. Top of head somewhat flattened, with nineteen shields. Internasals in contact between anterior prefrontal and rostral. Prefrontals three, a pair in contact between frontal and anterior; latter broader than long, hexangular. Frontal hexangular, widening forward, obtuse angled in front. Supraoculars four on each side, anterior small, in contact with frontal and prefrontals. A pair of small quadrangular parietals, separating occipitals and frontal, in contact by their interior angles. Interoccipital elongate, narrow, wider and acute-angled forward. Posteriorly each occipital is joined by a large broad scale and laterally by an elongate temporal. Three plates between the angle of the eye and the nasal, anterior small. Rostral little broader than high, convex. Temporals 1—2, lower posterior large, semicircular margin forward, resting upon the hinder labial. Labials eight, anterior five lower, posterior three larger, sixth and seventh in contact with the small scales covering the eyelid, fourth and fifth in contact with a pair of small scales below the front angle of the eye. Mental large, broader than long, broader than rostral. Infralabials eight (8—9). A broad submental (1—2) immediately behind the mental. Behind these there are three nearly as broad, the front pair of which are in contact. Farther back there are one or two elongate narrow shields touching the infralabials. Scales

and movements so rapid that the flash and rustle of disappearance are most often all that tell of its presence, and which, when caught napping by the sharp-sighted hunter, in favorite haunts in the wood among the rocks or about the buildings, frequently secures freedom by leaving its tail as a trophy in the hand of the enemy while retiring, but little the worse for the loss, to grow another. Its most common name is "Skink." This name is shared with many other species of the large family to which it belongs, a family which has representatives in nearly all the tropical and subtropical parts of the earth. In some of the West Indies allied species are called "Slippery Backs," in others "Mabouia," and in the United States "Blue tails" and "Scorpions."

Captain John Smith mentions the occurrence of lizards on the Bermudas previous to 1623, but in the same breath says they no longer existed at that date. "Lizards there were many and very large, but now none, and it is said they were destroyed by the Cat." There is a possibility that formerly some large species existed here, as at present upon Navassa (*Metapoceros*), or upon the Galapagos (*Conolophus* and *Amblyrhynchus*). Yet it is hardly probable that any lizards were entirely exterminated; it is more likely that the existing species, being without enemies and undisturbed, reached a greater size than is possible on the islands densely populated as they now are. One can have little idea of what the Captain had in mind when he used the word "large." If there had been very large lizards other writers would not have passed them without notice. Rev. Lewis Hughes, 1614, says nothing about them. Among his statements concerning the animals, after enumerating the birds, he says that "Here is no kind of beasts but hogges and cattes and they but in one or two places which are thought to come at first by

smooth, with two pores, hinder margin rounded, in thirty-six longitudinal rows, those of the flank irregularly ascending backward. Scales of middle of back and belly larger, those under the middle of the tail broadest. A small plate on each side of the pair of large ones in front of the vent.

Colors of young light brown on back, dark on flanks, lighter and bluish beneath. A dark-bordered white line along each edge of the back from the anterior supraciliary to the tail. A similar more or less broken line from below the eye across the ear to the hip. Between the white bands the flanks are dark brown. The dark color shades into the bluish at the sides of the abdomen. A narrow white band extends along the inner edges of the supraciliaries forward around the outer edges of prefrontals. Chin and throat yellowish red, cheeks more brown, and top of head reddish brown. Limbs and sides of belly and tail mottled with light. With age the white becomes more obsolete, the ground color a more uniform darker brown, and the yellowish red predominates on cheeks and crown. Specimens described furnished by Professor Goode, for whom they were collected by J. Mathew Jones, esq.

Very common on the Bermudas, frequenting the old walls and stone heaps in the cedar groves (Jones).

means of Shippe-wracke. The hogges were manie, but are now brought to a small number." Lizards do not appear in the list noted by William Strachy, 1610. "Worms I neuer saw any, nor any venomous thing, as Toade, or Snake, or any creeping beast hurtfull, onely some Spiders, which as many affirme are signes of great store of Gold." John Hardy's poetical description of the Bermudas, 1671, tells us that "No Adders, Serpents, Toads, or Snakes are seen to prejudice Man's health," but says nothing of lizards.

In recent times there have been several notices, one of which, that of Mr. Jones, in "The Naturalist in Bermuda," 1859, reports them to be very common. From the work of Dr. T. L. Godet, 1860, p. 251, the following is taken :

"In the class Reptilia (reptiles) we find the order *Chelonia* (the turtle tribe). This order is represented by the green turtle (*Chelonia mydas*, Holbrook); and the hawk's-bill (*Chelonia caretta*, Holbrook) is more or less brown or rufous. In the order *Sauria* we have the lizard tribe. The saurian reptiles are distinguished from the chelonian by the want of a shield and by the presence of teeth. The bluetailed skink (*Scincus fasciatus*, Holbrook) and the *Scincus ocellatus* (Da.) are representatives of this order. The *Scincus ocellatus* burrows in the sand so quickly that it is out of sight in an instant, and appears rather to have found a hole than made one. In the class Reptilia we have had occasion to name but a few genera and species; so barren are these islands in that class of animals which respire by lungs, having red and cold blood, and bodies covered with horny or cartilaginous plates or with hard scales."

Apparently the doctor supposed there were two species of Bermuda lizards, but of those he mentions, one, *fasciatus*, belongs to the Southern United States, and the other, *ocellatus*, to Australia, and neither is found on these islands. The species found here is evidently not a recent arrival. It differs so much from any of its neighbors in the new world that the question of its origin has become quite a puzzle. Scincs, Geccos, and other small reptiles of similar habits are sometimes carried immense distances in the ballast or cargoes of vessels. There would be no great difficulty in the way of introduction, but as yet we know of no species so closely allied as to suggest a common parentage among the more immediate ancestry.

The other four species making up the reptilian fauna of the Bermudas belong to the Sea Turtles, whose erratic habits and great capabilities as mariners have made them visitors upon all the shores of the

temperate and torrid zones long enough before our race is said to have taken its first lessons of navigation in boats made of their gigantic shells. Of two of the four, Mr. Jones says that the Green, *Chelonia mydas*, is "the common turtle of the Bermudas," but "not abundant"; and the Hawkbill, *Eretmochelys imbricata*, is "not unfrequently taken."

The other two, the Leather Back, *Sphargis coriacea*, and the Loggerhead, *Thalassochelys caouana*, are only occasional visitors. They were first placed upon the list by Professor Goode, 1877. Below I have quoted from a number of accounts of the Bermudas and their life by the pens of those who wrote during the first half century of the existence of the colony. These quotations give a fair idea of the abundance, habits, and capture of turtles in those early days. Below them is placed all that could be gathered in the West Indies and among the Florida Keys, where the turtles are still numerous, but where, as was the case in the Bermudas, reckless destruction is gradually reducing their numbers.

The history of the Bermuda reptiles reaches back to a very early date in that of the islands themselves. December 17, 1593, the French vessel, commanded by de la Barbotière, was wrecked upon the Isle of Bermuda, and it was not until the 11th of the following May that the crew was able to get away, which they finally did in a vessel of their own make. Henry May, an Englishman who happened to be with the party, furnished an account of the adventure and the construction of the vessel, in which occurs the following:

"In stead of pitch we made lime, and mixed it with the oyl of tortoises, and as soone as the carpenters had calked, I and another, with ech of vs a small sticke in our hands, did plaister the mortar into the seames, and being in April, when it was warm and faire weather, we could no sooner lay it on, but it was dry, and as hard as a stone. In this moneth of April 1594, the weather being very hot, we were afrayd our water should fayle vs; and therefore made the more haste away; and at our departure we were constrayned to make two great chests, and calked them, and stowed them on ech side of our mainmaste, and so put in our prouision of raine water, and thirteen linc tortoises for our food, for our voyage which we intended to Newfoundland. In the South part of this Island of Bermuda there are hogs, but they are so leane that you cannot eat them, by reason the Island is so barren, but it yieldeth great store of fowle, fish and tortoises."

An anonymous writer, in an account of the loss of the ship of Sir

George Summers, July 28, 1609, among other things upon which his party subsisted, says: "Lastly they found the berries of Cedar, the Palmetto tree, the Prickle peare, sufficient fish, plentie of Tortoises and diners other kinds which sufficed to sustaine nature." Sylvanus Jourdan's narrative of the same occurrence adds:

"There are also great store of Tortoises (which some call turtles), and those so great, that I have seene a bushell of egges in one of their bellies, which are sweeter than any Henne egge: and the Tortoise itselfe is all very good meate, and yieldeth great store of oyle, which is as sweete as any butter: and one of them will suffice fifty men a meale at least: and of these hath beene taken great store, with two boates at the least forty in one day. . . . We carried with vs also a good portion of Tortoise oyle, which either for frying or baking did vs very great pleasure, it being very sweete nourishing and wholesome."

William Strachy's account of this event is still more complete. It is strange he makes no mention of the lizards in his enumeration of the animals:

"Wormes I neuer saw any, nor any venomous thing, as Toade, or Snake, or any creeping beast hurtfull, onely some Spiders, which as many affirme are signes of great store of Gold. . . . And when there was any fret of weather (for vpon euery increase of wind the billow would be so great, as it was no putting out with our Gundall or Canow) that we could not fish nor take Tortoyeses, then wee killed our Hogs. But in February when the Palme Berries began to be scant or dry, and the Cedar berries failed two moneths sooner, true it is the Hogs grew pöore, and being taken so, wee could not raise them to be better, for besides those Berries we had nothing wherewith to franke them: but euen then the Tortoyeses came in againe, of which wee daily both turned vp great store, finding them on Land, as also sculling after them in our Boate strooke them with an Iron goad, and sod, baked, and roasted them. The Tortoyse is reasonable toothsom (some say) wholesome meate. I am sure our Company liked the meate of them verie well, and one Tortoyse would goe further amongst them then three Hogs. One Turtle (for so we called them) feasted well a dozen Messes, appointing sixe to euery Messe. It is such a kind of meat as a man can neither absolutely call Fish nor Flesh, keeping most what in the water, and feeding vpon Sea-grasse, like a Heifer, in the bottom of the Coues and Bayes, and laying their Egges (of which wee should finde five hundred at a time in the opening of a shee Turtle) in the Sand by the

shoare side, and so couering them close leaue them to the hatching of the Sunne, like the *Manati* at Saint *Dominique*, which made the *Spanish Friars* (at their first arrinall) make some scruple to eate them on a Friday, because in colour and taste the flesh is like to morsells of Veale. Concerning the laying of their Egges, and hatching of their young *Peter Martyr* writeth thus in his *Decades of the Ocean*: At such time as the heate of Nature moueth them to generation, they come forth of the Sea, and making a deepe pit in the sand, they lay three or foure hundred Egges therein: when they haue thus emptied their bag of Conception, they put as much of the same againe into the Pit as may satisfie to couer their Egges, and so resorte againe vnto the Sea, nothing carefull of their succession. At the day appointed of Nature to the procreation of these creatures there creepeth out a multitude of Tortoyses, as it were Pismyers out of an anthill, and this only by the heate of the Sunne, without any helpe of their Parents: their Egges are as big as Geese Egges, and themselues growne to perfection, bigger than great round Targets."

The date of depositing the eggs is somewhat earlier than that given by the Florida Turtlers. Striking with an iron goad is a hint of what is now known as pegging. Speaking of the pinnace they built, he says: "Wee breamed her otherwise with Lime made of Wilkeshels and an hard white stone which we burned in a kiln, slaked with fresh water, and tempered with Tortoyses Oyle." In the commission of Governor Moore, 1612, he is requested to "be very carefull to make tryall of a mixture made with oyle of tortoises and powder of shells or such like, weh necessitie compeld our men to find ovt for there vse instead of pitch and tarr for trimminge there shipps, and did them excellent service for that purpose." One of this governor's companions, in a letter supplementing Silvanus Jourdan's account, gives the name "Turkles," a form which I find still to be in use in Eastern Massachusetts. "Turkles thare bee of a mightie bignes: one Turkle will serue or suffice three or four score at a meale, especially if it be a shee Turkle, for she will haue as many Egges as will suffice fiftie or three-score at a meale; this I can assure you, for they are very good and wholesome meate, none of it bad, no, not so much as the very guts and maw of it, for they are exceeding fat, and make as good tripes as your beastes bellies in England. . . Also, we haue olives grow with vs, but no great store: many other good excellent things we haue grow with vs, which this short time will not permit me to write on so largely as I might:

but this is of truth that Hogges, Turkles, Fish and Fowle doe abound as dust of the earth."

That wanton destruction had decidedly lessened the number of turtles as early as 1620 is evident from the following act of the Assembly of that year :

"AN ACT AGAYNST THE KILLINGE OF OUER YOUNG TORTOYSES.

"In regard that much waste and abuse hath been offered and yet is by sundrye lewd and imprudent psons inhabitinge wthin these Islands who in there continuall goinges out to sea for fish doe upon all occasions, And at all tymes as they can meete with them, snatch & catch up indifferentlye all kinds of Tortoyses both yonge & old little and greate and soe kill carrye awaye and devoure them to the much decay of the breed of so excellent a fishe the daylye skarringe of them from of our shores and the danger of an utter distroyinge and losse of them.

"It is therefore enacted by the Authoritie of this present Assembly That from hence forward noe manner of pson or psons of what degree or condition soeuer he be inhabitinge or remayninge at any time wthin these Islands shall p'sume to kill or cause to be killed in any Bay Sound Harbor or any other place out to Sea: being wthin five leagues round about of those Islands any young Tortoyses that are or shall not be found to be Eighteen inches in the Breadth or Dyiameter and that upon the penaltye for euerye such offence of the fforfeiture of fifteen pounds of Tobacco whereof the one half is to be bestowed in publike uses the other upon the Informer."

Allusions to the turtles become less frequent in the latter half of the century. In fact, it would seem as if the first twenty or thirty years of the settlement's existence had served so to reduce their numbers as to make them somewhat rare. This is the opinion of General Lefroy, to whose great work on the Bermudas I am indebted for the early history. In the preface of his work (*Mem. Bermudas*, Vol. I, preface, p. viii) he says: "The abundance of turtle, fish, and fowl rapidly came to an end." Other writers of recent times mention them as occurring in the waters off the shores, but do not speak of them as abundant. General Lefroy states in a foot-note (Vol. I, p. 67) that "The largest hawksbill turtle killed for many years past weighed 150 pounds; the largest green turtle 145 pounds in the shell." General Nelson, *Geology of Bermuda*, 1837, notes the occurrence of very large turtle bones in the sands near the shore. I give his statements at second hand, as found in Mr. Jones's book: "Turtle bones have also been dug up in the loose sand of the sea-

beach, the turtles sharing the same fate as the bird before mentioned, being buried whilst depositing their eggs. Colonel Nelson was informed by an eye-witness that the dimensions of the skeletons of these animals were 9 feet in length by 7 in breadth." It is unfortunate that we do not know the species of turtle to which these bones belonged. There is room for difference of opinion in regard to the time of the turtle's interment. During storms bodies that have been thrown upon the beach by the waves are sometimes buried to considerable depths by the sand. A short time after the "epidemic" that was so fatal to the fishes on the western coast of Florida, in the fall of 1878, I saw the bodies of a number of large turtles, probably killed by the same cause, floating along with the myriads of dead fishes in the edge of the Gulf Stream. A storm from a particular direction might have heaped up and buried that refuse of death upon the windward shore of some land, perhaps to be unearthed again by geologists of the future who would reckon the age of that stratum in millions of years.

The turtles of the Bermudas are of species more abundant in the West Indies and around the shores of the Caribbean and the Gulf of Mexico. Consequently I have not hesitated to gather in those localities, where it was more accessible, information concerning these creatures for use in an account of Bermuda reptiles. There is little doubt that turtles from the West Indies visit the Bermudas. The sea turtles are capable of enduring such an amount of hunger and fatigue, and are possessed of such powerful muscular organization, that, aided by the tides and currents, they perform journeys of almost incredible length. It is not a very rare occurrence that they are met with in mid-ocean. Those taken on the coasts of England are supposed to have crossed the Atlantic with the help of the Gulf Stream. Some herpetologists think it likely that turtles cross the Atlantic and enter the Mediterranean. The Leatherback and Loggerhead are the most erratic. Though their proper home may be said to extend not more than 35° on each side of the equator, they are found straggling as many as 15° farther to the north or south. If specimens enter the Atlantic from the other oceans it is most likely to be by way of the Cape of Good Hope, where the currents would seem to favor the passage. However, there is only one case in which there is any doubt, that of *Sphargis*, of which specimens from the different oceans are so much alike that writers are still undecided whether there is more than one species. Certain respects in which the Pacific "Trunkbacks" differ from those of the Atlantic have induced

me to separate them, distinguishing the former by the name *Sphargis schlegelii*, and the latter by that by which it is commonly known, *Sphargis coriacea*.

The Green Turtle, *Chelonia*, and the Hawkbill, *Eretmochelys*, seldom venture more than 35° from the equator. Species of these genera are unlike in the Atlantic and Pacific. Those of *Chelonia* are most numerous and seem to vary most according to locality, which would suggest a disposition less erratic or perhaps a distribution determined to some extent by that of the grass of their favorite pastures. On our coasts these turtles range from the Carolinas to Southern Brazil, and from Southern California to Peru. The places of greatest abundance are on the shoals in the vicinage of low sandy beaches or islands not occupied by men. Persons who make a business of collecting turtles and eggs in the Florida Keys and among the West Indies claim that the great demand has resulted in no diminution of the numbers. In the Bermudas, as we have seen, those well able to decide are satisfied that turtles are growing less numerous.

For much of the information given below I am indebted to my friend Richard M. Kemp, of Florida, who has taken great pains to secure answers to the lists of questions sent out; the balance was gathered upon the grounds by observation or from the turtlers. His notes included items concerning the "Bastard," a turtle intermediate between the Loggerhead and Green, of which he was fortunate enough to secure a pair of fine specimens and which have been elsewhere described under the name *Colpochelys Kempii*. Young turtles of the five kinds are eaten. Green turtles are most sought. Old ones of the other kinds are not so palatable. Bastards and Trunkbacks are least cared for. All kinds are found in the same region during the entire year. "They eat seaweed, crawfish, conchs, fish, a kind of sponge called Loggerhead sponge, and the Portuguese men-of-war." The latter, *Physalia*, are quite plentiful in the winter, and turtles of all kinds are very fond of them and are easily taken while eating. They shut their eyes to avoid the stings of the men-of-war, constantly using the flippers to brush them away and can at such times be approached and taken into a boat without pegging. On the turtle grounds there were numbers of specimens of a large marine sponge, sometimes as much as 3 feet in diameter, and with very little silicious framework, from which portions had been torn. These were said to be Loggerhead sponges from which turtles had been eating. A larger proportion of the food of the Green Turtles

is vegetable. When in the crawls or turtle pens they are fed upon fishes and meats of various kinds, as are the other sorts. The principal food of the genus (*Chelonia*) seems to be the sea-grass, *Zostera marina*, commonly called "Turtle Grass." When grazing turtles eat the roots, and the tops of the grass rising to the surface mark the feeding ground and often betray them to the "turtler." My informant tells me the Loggerheads nip the smaller portion of the spiral from the large conchs, and in this way extract the animal. Trunkbacks sometimes exceed 1,200 pounds in weight. The largest we have been able to measure was close upon 7 feet in length and weighed about 1,000 pounds. The Green are next in size. Eight hundred and fifty pounds is the largest of which we can learn. The largest Loggerhead of which we have positive information did not exceed 450; and Mr. Kemp says a shell turtle weighing 160 pounds is a very large one.

Near the haunts prices of the meats vary from 4 to 10 cents per pound alive, and from 12 to 18 dressed. A specimen of Green Turtle weighing 100 pounds is considered to be between three and four years of age. In its first year it would attain a weight of 15 to 20 pounds. Turtles are captured by pegging, by means of long nets, and when they come on shore to lay. Ordinarily the creatures are timid and endeavor to escape. In the water it is not very difficult to follow them, as they rise from time to time to breathe. When tired out they go to the bottom, and seldom make much resistance to being hauled on board the boat or towed ashore by a line attached to the peg. A peg is a small steel instrument like a blunt nail, to which a long cord is attached, and which slips out of the socket in which it is placed, on the end of a long pole, on being struck into the shell of the turtle. Being firmly wedged by the bone, the peg enables the turtler to draw his prey about by the line attached to it. By much practice the turtlers become very dexterous in taking objects in the water. One who assisted me in collecting, and to whom I am indebted for a great deal of information, Daniel Williams, of Florida Keys, did not seem to have his aim at all affected by differences of depths or angles in situations in which a novice would find it difficult to strike objects of five times the size. During the mating season turtles are much less timid, and boats are allowed to approach quite near. The season varies somewhat for the different kinds. From the most reliable accounts it is April to June for the Green, Loggerhead, and Shell turtles (Hawkbill), and for Bastard and Trunkback it is December to February (see below). Coupling takes place in the water and

continues for considerable lengths of time. A strong nail on the first digit of the forward paddles is bent downward so as to form a hook, with which the shell of the female is grasped. "From two to four, sometimes five, lots of eggs, from 75 to 200 each, are laid in a season." The layings are fourteen to fifteen days apart—"never more than fifteen nor less than fourteen; so we know just when to expect her again, and always very near the place where she laid the first lot."

The nests are made at night. About to lay, the turtle approaches the shore cautiously; if not disturbed she lands and at once proceeds to select a place to dig. The excavation is a foot or more in depth. After the sand has been scooped out by the paddles and the eggs laid, the sand is replaced carefully and packed by the weight of the body during replacement. The trail from the water to the nest resembles the track of a stone-sled and leads to a space larger than the turtle which has been much trampled over. Somewhere in this space the turtler expects to find the eggs. He uses a small stick with which he probes the trodden area in all parts until, plunged through one or more of the eggs, the yelk upon the probe locates them. A story is told by the hunters to the effect that after the nest is finished the turtle goes along the beach a little way to trample over another space, in which no eggs are placed, before returning to the water. On the fourteenth or fifteenth night she is expected to return and make another nest near the first. The hunter waits for her, and after she has left the water turns her on her back. She is unable to right herself when turned, and her captor returns at his leisure to take her to market. The eggs hatch in six to eight weeks, and the young scramble into the water at once. They have no means of defense, and are eagerly preyed upon by various birds and fishes on their way and after they reach the sea. In the stomach of a shark, which the kindness of Lieut. S. M. Ackley, U. S. N., enabled me to examine, a 10-pound Green Turtle was found. The shell was too hard for the shark's teeth, and was scored all over by the efforts of the "man-eater" to divide it. Discouraged in his attempts he had at last swallowed it entire. The greatest destruction undoubtedly takes place during the first month or two of existence, while the shell is comparatively soft and the size such as places the little creatures at the mercy of the fowls and most of the common fishes.

It will be seen that the Florida authorities place the egg-laying time in April, May, and June; in this they agree with the majority. The notice cited above from William Strachy's narrative apparently places

it earlier, but it does not fix an exact date for the arrival of the turtles on the shore. In regard to *Sphargis*, however, I find something more conflicting, and, it being so definite as to dates, locality, &c., am inclined to believe it entitled to consideration. The item is copied from the Morning Journal of April 30, 1846, by Gosse in "The Naturalist's Sojourn in Jamaica," 1859, p. 306, and bears the marks of its origin in evidence of desire to make the most of it, yet, as Mr. Gosse suggests, it has sufficient appearance of accuracy to warrant preservation. The locality of the occurrence is Negril Bay, at the west end of Jamaica:

"The anxiety of the fishermen in this little village was aroused on the 30th of last month by the track of a huge Sea-monster, called a Trunk-turtle, which came on the sea-beach for the purpose of laying her eggs. A search was made, when a hole in the sand was discovered, about 4 feet in depth, and as wide as the mouth of a half-barrel, whence five or six dozen white eggs were taken out. The eggs were of different sizes, the largest the size of a duck's egg. On the morning of the 10th of this month, at half-past five o'clock, she was discovered by Mr. Crow on the beach, near the spot where she first came up. He gave the alarm, when all the neighbors assembled and got her turned on her back. She took twelve men to haul her about 200 yards. I went and measured her, and found her dimensions as follows: From head to tail, 6 feet 6 inches; from the outer part of her fore fin to the other end (to the tip of the other?), 9 feet 2 inches; the circumference round her back and chest, 7 feet 9 inches; circumference of her neck, 3 feet 3 inches; the widest part of her fore fins, 18 inches; her hind fins, 2 feet 4 inches in length. Her back is formed like a round top of a trunk, with small white bumps in straight lines, resembling the nails on a trunk; her color is variegated like the rainbow (probably the living skin displayed opaline reflections); there is no shell on her back, but a thick skin, like pump leather."

The date given would place the time of laying in the latter part of March instead of as early as claimed by the fishermen and turtlers, December, January, and February, for this genus. *Sphargis* is the most rare and least known of the sea turtles.

In early times turtles were so numerous around the Bermudas that two boats were able to take forty in a day; now they are so rare that this number more nearly represents what are taken in a season. To any one who takes the trouble to look into the matter the fact is patent enough that unless their enemies are restrained these animals are des-

tinged to become as rare in the waters of Florida and the West Indies as they are now about the Bermudas. It would seem as if, with proper protection by law, a creature which lays such a large number of eggs and grows so rapidly might be propagated and multiplied to almost any extent in regions growing their favorite food. We know of nothing else for which their pastures are so available. What locality is better situated than the Bermudas for a grand experiment in turtle culture? Turtles hatch and take care of themselves if let alone. Any movement that will protect them in the coupling and laying season and in their early days, or that will reduce the number of their destroyers, will tend to increase and cheapen the supply. Possibly eggs might be collected and hatched, the young guarded for a while, and set free after the days of greatest mortality had passed and they had grown too large and hard for the birds and smaller fishes. Eggs could be imported. Perhaps some action has already been taken in regard to the matter in the Bermudas and in the United States; if not, the question is respectfully suggested to the authorities as one worthy their attention.

LIST OF THE SEA TURTLES (CHELONIOIDÆ), WITH SYNONYMY.

ERETMOCHELYS IMBRICATA. Hawkbill. Caret.

Hab. Tropical Atlantic.

Chelonia (Eretmochelys) imbricata Fitz., 1843, Syst. Rept., 30.

Eretmochelys imbricata Agassiz, 1857, Contr. i, 381; Goode, 1877, Am. Jour. Sci., xvi, 290.

Testudo imbricata Linn., 1758 Syst. Ed. x, I, 197; 1766, Syst. Nat., Ed. xii, 350; Walb., 1782, Chelon., 46, 110; Schneid., 1783, Schildkr., 309,—1786, Mag. Z. Nat., 258; Gmelin, 1788, Linn. Syst. Nat., i, 1036; Donnd., 1798, Zool. Beitr., 3, p. 3; Schoepff, 1792, Hist. Test., 83, pl. 18 A and B; Latr., 1801, Hist. Rept., i, p. 50; Shaw, 1802, Gen. Zool., iii, 89, pl. 26 and 27; Daudin, 1805, Hist. Rept., v, p. 39.

Chelonia imbricata Schweigg., 1814, Prodr. Monogr. Chelon., 21; Gravenh., 1829, Del. Mus. Vrat., I, 6; Wagl., 1830, Syst. Amph., 133; Gray, 1831, Cataphracta, p. 52; Gray, 1831, Syn. Rept., Griff. An. King., ix, p. 21; Dum. Bibr., 1835, Erp. Gen., v, 547, pl. 23, f. 2; Bell, 1839, Brit. Rept., pp. 1 and 10; Holbr., 1842, N. A. Herp., ii, 39, pl. v; Coct. & Bibr., 1842, Rept. Cuba, 28; Bell, 1849, Brit. Rept., pp. 1 and 11, fig.; Dum., 1851, Cat. Meth., 25; Strauch, 1862, Chelon. Stud., 181; Sowerby & Lear, 1872, Tortoises, pl. 57 and 58; Temm. & Schl. 1838, Fauna Jap., Rept., p. 13. pl. V. f. 1, 2.

Caretta imbricata Merr., 1820, Syst. Amph., 19; Max., 1825, Beitr. Nat. Brazil, i, 24; Fitz., 1826, Neue Class. Rept., 44; Bonap., 1836, Chelon. Anal., 9; Gray, 1844, Cat. Tort., 54; Gray, 1855, Cat. Sh. Rept., 74 (part); Gray, 1870, Suppl. Cat. Sh. Rept., 119; Gray, 1873, Pr. Zool. Soc., 397; Gray, 1873, Hand list, 92; Girard, 1858, U. S. Expl. Exp. Rept., p. 440.

Onychochelys kraussii Gray, 1873, Pr. Zool. Soc., 398; Gray, 1873, Hand list, p. 93.

Chelonia virgata Wagl., 1833, Icon et Descr. Amph., pl. 29.

Chelonia multiscutata Kuhl, 1820, Beitr., 78.

References under various names: Rochefort, 1658, Hist. Ant., 231; DuTertre, 1667, Hist. Gen. Ant., ii, 229; Grew, 1681, Mus. Reg., 38, pl. 3, f. 4; Labat, 1724, Voy. Amer., i, pp. 182, 308; Sloane, 1725, Jamaica, ii, 331; Seba, 1734, Thesaur., i, 79, f. 4; Catesby, 1743, Carol., ii, 39; Brown, 1756, Jamaica, 465; Knorr., 1767, Delic. Nat., ii, p. 124, pl. 30; Daub. Diet. Encycl., 1784-'92; Parra, 1787, Descr., &c., 112, pl. 42; LaC., 1788, Quad. Ovip., i, p. 105, pl. ii; Donnd., 1798, Zool. Beitr., iii, 3; Shaw, 1802, Gen. Zool., iii, 89, tab. 26 and 27; Bosc, Nouv. Dict., 1816-'19, vol. 34, 257; Cuv., 1817, Régn. Anim., 13; Kuhl., 1820, Beitr., 78; Lesson, 1834, Belang. Voy., 302; Bonnat., 1789, Erpét., 21; Ray, 1693, Synops., 260.

ERETMOCHELYS SQUAMATA. Hawkbill.

Hab. Tropical Pacific and Indian Oceans.

Eretmochelys squamata Agassiz, 1857, Contr., i, 385.

? *Caretta bissa* Rüpp., 1835, Neue Wirb. Abyssin., 4, taf. 2.

Chelonia imbricata Blyth, 1846, Jour. As. Soc., 376; Tschudi, 1845, Fauna. Peru, Rept., 22.

Caretta imbricata Kelaart, 1852, Rept. Ceylon, i, 180.

Caretta squamata Krefft, 1871, Austral. Vertbr., 39; Theobald, 1876, Rept. Ind., 33.

Caretta Squamosa Girard, 1858, U. S. Expl. Exp. Rept., 442.

Caretta rostrata Grd., 1858, Expl. Exp. Rept., 446, pl. xxx, f. 8-13.

Testudo imbricata Penn., 1769, Ind. Zool., 87.

Le Caret Ferm., 1765, Hist. Holl. Équinox., 50.

THALASSOCHELYS CAOUANA. Loggerhead. Caouane.

Hab.—Tropical Atlantic.

Thalassochelys caouana Fitz., 1841, Zool. Ann. Wien Mus., i, 128,—1843, Syst. Rept., 30; Agassiz, 1857, Contr., i, 384; Goode, 1877, Am. Jour., 290.

Testudo caretta, Linn., 1758, Syst., Nat. 197; Linn., 1766, Syst., Nat. 351; Walb., 1782, Chelon., 4, 95; Gmel., 1788, Syst. Linn., 1033; Schæpff, 1792, Hist. Test., pp. 67, 74, pl. 16, 17, f. 3; Donnd., 1798, Zool. Beitr. iii, 9; Latr., 1801, Hist. Rept., i, p. 33; Shaw, 1802, Gen. Zool., iii, 85, pl. 23, 24, 25; Cuv., 1829, R. An., ii, 14; Griff., Pidg., 1831, An. King., ix, 20.

Caretta caouana Fitz., 1826, Neue Class. Rept., 44.

Chelonia caretta Gravenh., 1829, Del. Mus. Vrat., I, 7.

Caouana caretta Gray, 1844, Cat. Tort., 52; Gray, 1855, Cat. Sh. Rept., 73; Gray, 1870, Suppl. Cat. Sh. Rept., 118; Gray, 1873, Pr. Zool. Soc., 404; Gray, 1873, Hand-list, 89.

Chelonia caouana Schweigg, 1814, Prodr. Monogr. Chelon., 22; Risso, 1826, Eur. Merid., iii, 85; Wagl., 1830, Syst. Amph., 133, Tab. i, f. 1-23; Gray, 1831, Syn., 53; Bibr., 1832, Exp. Morée, Zool. 64; Dum. Bibr., 1835, Erp. Gen., ii, p. 552; Dum., 1851, Cat. Meth., 25.

Testudo caouana Bonnat., 1789, Érpét., 20; Daud., 1805, Rept., ii, p. 54, pl. 16, f. 2; Cuv., 1817, R. An., ii, 13.

Testudo cephalo Schneid., 1783, Schildkr., 303.

Caretta cephalo Merr., 1820, Amph., 18; Max., 1825, Beitr., i, 25; Risso, 1826, Eur. Merid., iii, 85.

Chelonia (caretta) cephalo Less., 1834, Voy. Belang., 300.

Chelonia (caonana) cephalo Coct. & Bibr., 1843, Rept. Cuba, 35.

Chelonia cephalo Temm. & Schleg., 1833, Faun. Jap., 23, f. 1, 2, 3, pl. 4.

Chelonia pelagorum Val., 1840, Rept. Morea, tab. 10.

Cephalochelys oceanica Gray, 1873, Pr. Zool. Soc., 408; Hand-list, 91.

Caonana elongata Gray, 1855, Cat. Sh. Rept., 73; Suppl., 1870, p. 118.

Eremonia elongata Gray, 1873, Pr. Zool. Soc., 403; Hand-list, 96.

Thalassochelys corticata Grd., 1858, Expl. Exp. Rept., 431; Strauch, 1862, Chelon. Stud., 187.

UNDER VARIOUS NAMES: Rondelet, 1554, Pisc. Libr., xvi, 445; Gesner, Aquat. Libr., 3, 1131; Gesner, 1554, Hist. Anim. Quad. Ovip., 114; Gesner, 1629, Hist. Anim., iv, 944; Aldrov. 1621, Quad. Ovip., 712; Rochefort, 1658, Hist. Ant., 231; Olear. Mus., 1666, 27; Dutertre, 1667, Hist. Ant., ii, 228; Ray, 1692, Synops. An., 257; Labat, 1724, Voy. Amer., i, pp. 182, 311; Seba, 1734, Thesaur., i, pl. 79, f. 6; Catesby, 1743, Carol., ii, 40; Brown, 1756, Jamaica, 465; Gronow, 1763, Zooph., p. 16, No. 71; Gottw., 1781, Phys. Anat. Schildkr; Parra, 1787, Deser., etc., 112, pl. 43; La C., 1788, Quad. Ovip., i, 95; Bechst. 1800, Ueb. La C., i, 110; Meyer, Zeitr.-Vertr., i, pl. 30, 31; Brown, 1776, Ill. Zool., 116, pl. 48; Mus., Besl., pl. 60; Edwards, Birds t, 206; Bosc, Nouv. Diet., vol. 34, p. 256, 1816-19; Cuv., 1817, Regn. Anim., 14.

THALASSOCHELYS OLIVACEA. Loggerhead.

Hab.—Tropical Pacific and Indian Oceans.

Chelonia olivacea Eschsch., 1829, Zool. Atl., Tab. 3, Deser., p. 2 (20); Cantor, 1847, Cat. Malay. Rept., 13.

Thalassochelys (Lepidochelys) olivacea Fitz., 1843, Syst. Rept., 30.

Thalassochelys olivacea Fitz., 1841, Zool. Ann. Wein Mus., i, 128; Agassiz, 1857, Contr., i, 385.

Chelonia dussumierii Dum. Bibr., 1835, Erp. Gen., ii, 557; Dum., 1851, Cat. Meth., 25.

Caonana dussumierii Smith, 1849, Zool. S. Africa, App., p. 2.

Chelonia caretta var. β , Gray, 1831; Cataphracta, 54.

Caonana olivacea Gray, 1844, Cat. Tort., 53; Gray, 1855, Cat. Sh. Rept., p. 73; Gray, 1870, Suppl. Cat. Sh. Rept., 118; Theobald, 1868, Jour. Linn. Soc., x, p. 20; Krefft, 1871, Austral. Vetebr., 39; Theobald, 1876, Rept. Ind., 32.

Lepidochelys olivacea Grd., 1858, Wilkes Exp. Rept., 435; Gray, 1873, Pr. Zool. Soc., 407; Gray, 1873, Hand-list, 91.

Caretta olivacea Rüpp., 1835, Neue Wirbelth. Abyssin., 7, pl. 3.

Testudo japonica Thunb., 1787, Vet. Akad, viii, 178, pl. vii; Schn., Gesellsch Nat. Fr. Berl., x, 266.

Caretta thunbergii Merr., 1820, Syst., 19.

Lepidochelys dussumierii Grd., 1858, Expl. Exp., 437.

THALASSOCHELYS (COLPOCHELYS) KEMPIL.

Kemp's Gulf Turtle. "Bastard."

Hab.—Northeastern part of the Gulf of Mexico.

Thalassochelys Kempil Garman, 1880, Bull. Mus. Comp. Zool., 123.

CHELONIA MYDAS. Green Turtle.

Hab.—Tropical Atlantic and adjacent waters.

Testudo mydas, var. γ Linn., 1758, Syst. Nat., 197; Linn., 1766, Syst. Nat., 351; Gmel., 1788, Linn., Syst. Nat., i, 1037.

Testudo mydas, Schœpff, 1792, Hist. Test., 73, pl. 17, f. 2; Bonnat, 1789, Erpét., 19; Cuv., 1798, Tabl. Élém. 288, 1817, R. An., ii, 13, 1829, R. An. ii, 13; Oppel, 1811, Prodr., 9; Latr., 1801, Rept., i, 22, pl. 1, fig. 2; Daud., 1805, Rept., v, 10, pl. 10, f. 2; Griff. & Pidg., 1831, An. King., ix, 81.

Chelonia mydas, Schweigg., 1814, Prodr. Monogr. Chelon., pp. 10 & 22; Gray, 1825, Ann. Phil., x, 212, 1831, Synops. in Griff. An. King., ix, p. 20; Gray, 1831, Cataphracta, 52; Lesson, 1834, Belang. Voy., 299; Dum. Bibr., 1835, ii, p. 558; Holbrook, 1842, N. A. Herp., ii, 25, pl. 2; Cocteau & Bibron, 1843, Rept. Cuba, 19; Dum., 1851, Cat. Meth. Rept., 24; Agassiz, 1857, Contr., i, 378; Sowerby & Lear, 1872, Tortoises, 13, pl. 59 & 60; Gravenh., 1829, Del. Mus. Vrat., i, 5; Wagl., 1830, Syst. 133.

Caretta mydas Fitz., 1826, Neue Class. Rept., 44.

Testudo viridis Schn., 1783, Schildkr., 309, Tab. ii; Latr., 1802, Rept., i, 48.

Chelonia viridis Temm. & Schl., 1838, Faun. Jap., 18; Gray, 1844, Cat. Tort., 54; Gray, 1855, Cat. Sh. Rept., 75; Strauch, 1862, Chelon. Stud., 185; Gray, 1870, Suppl. Cat. Sh. Rept., 119; Gray, 1873, Pr. Zool. Soc., 402; Gray, 1873, Hand-list, 95; Girard, 1858, Expl. Exp., Rept., 453.

Chelonia virgata Coct. & Bibr., 1843, Rept. Cuba, 26 (part).

REFERENCES UNDER VARIOUS NAMES: Dutertre, 1667, Hist. Ant., ii, 227; Sloane, 1725, Jamaica, ii, 331; Rochefort, 1658, Hist. Ant., 228; Seba, 1734, Thesaur., i, pl. 79, f. 5; Catesby, 1743, Carol., ii, 38; Brown, 1756, Jamaica, 465; Gronow, 1764, Mus. Ichth., ii, 85, No. 63; Parra, 1787, Descr., etc., 112, tab. 41; La C., 1788, Quad. Ovip., i, 54, fol. 1, p. 92; Shaw, 1802, Gen. Zool., iii, 80, pl. 22; Lesson, 1843, Belang. Voy., 298, 299, 301, 302; Cuv., 1829, Règn. Anim., ii, 13; Audubon, Ornith. Biog., ii, 374; Bonnat, Encycl. meth., pl. 3, f. 2; Bosc. Nouv. Dict., 1816-19, p. 252, tome 34; Merr., 1820, p. 18; Wiegman, Ruthe, 1832, Handb. Zool., 164; Tschudi, 1845, Fauna Peru., 22.

Var. *Marmorata*.

Hab.—Atlantic, Ascension Island.

Chelonia marmorata Dum. Bibr., 1835, Erp. Gen., ii, 546; Dum., 1851, Cat. Meth., 24; Girard, 1858, Expl. Exp. Rept., 455; Strauch, 1862, Chelon. Stud., 187.

CHELONIA VIRGATA. Green Turtle.

Hab.—Tropical portions of Western Pacific and Indian Oceans.

Chelonia virgata Schweigg., 1814, Prodr. Monogr. Chelon. 21; Guerin, 1829-38, Icon. Règn. Anim., pl. 1, f. 4; Dum. Bibr., 1835, Erp. Gen., ii, 541; Coct. & Bibr., 1843, Rept. Cuba (part); Blyth, 1846, Jour. As. Soc., 376; Cantor, 1847, Cat. Rept. Malay, 13; Gray, 1844, Cat. Tort., 54; Dum., 1851, Cat. Meth., 24; Gray, 1855, Cat. Sh. Rept., 74 (part); Agassiz, 1857, Contr., i, 379; Strauch, 1862, Chelon. Stud., 183; Swinhoe, 1863, Ann. Mag., 221; Theobald, 1868, Jour. Linn. Soc., x, 20; Gray, 1870, Suppl. Cat., Sh. Rept., 119; Krefft, 1871, Austral. Vert., 39; Gray, 1873, Pr. Zool. Soc. 402; Gray, 1873, Hand-list, 93; Theobald, 1876, Rept. Ind., 33; Girard, 1858, Expl. Exp. Rept., 437.

Chelonia mydas var. Gray, 1831, Cataphracta, 52, 53.

? *Chelonia maculosa* Cuv., 1820, Règn. Anim., 13; Dum. Bibr., 1835, Erp. Gen., ii, 544; Dum., 1851, Cat. Meth., 24; Girard, 1858, Expl. Exp., Rept., 454.

Chelonia lachrymata Cuv., 1829, Règn. Anim., ii, 13.

Caretta or *Sea Tortoise* Bruce, 1778, Voy. Nile, v, pl. 42.

? *Chelonia formosa* Girard, 1858, Expl. Exp., Rept., 456, pl. xxxi, f. 1-4.

? *Chelonia tenuis* Grd., 1858, Expl. Exp., Rept., 461.

? *Testudo macropus* Walb., 1782, Chelonogr., 112.

? *Euchelys macropus* Girard, 1858, Expl. Exp., Rept., 448, pl. xxxi, f. 9-11.

CHELONIA AGASSIZII.

Hab.—Tropical portion of Eastern Pacific.

Chelonia virgata Agassiz, 1857, Contr., i, 379.

Chelonia agassizii Dum. Boc., 1870, Exp. Sci. Mex., pt. 3, pl. 6, p. 26; Garman, 1880, Bull. Mus. Comp. Zool., 126.

CHELONIA DEPRESSA.

Hab.—Australian seas.

Chelonia depressa Garman, 1880, Bull. Mus. Comp. Zool., 124.

SPHARGIDIDÆ.

SPHARGIS CORIACEA. Trunk or Leather Turtle.

Hab.—Tropical and temperate portions of the Atlantic.

Testudo coriacea s. mercurii Rond., 1554, Pisc. libr., xvi, 450; Gesner, 1620, Hist. Anim., iv, 496.

Testudo coriacea Linn., 1766, Syst. Nat., 350; Schneid., 1783, Schildkr., 312; Vandell. ad Linn. Patav., 1761, fig.; Schœpff, 1792, Hist. Test., 123 to 123; Latr., 1801, Rept., i, 58, pl. 3, f. 1; Daud., 1805, Rept., ii, 62, pl. 18, f. 1; Turton, Brit. Fauna, 78; Griff. & Pidg., 1831, An. King., ix, 93.

Sphargis mercurialis Merr., 1820, Amph. 19; Risso, 1826, Eur. Merid., iii, 85; Max., 1825, Beitr. Natg. Brazil, i, 26; Gray, 1869, Pr. Zool. Soc., 224.

Chelonia coriacea Schweigg., 1814, Prodr. Monogr. Chelon., pp. 10, 20.

Chelonia (Sphargis) coriacea Gray, 1831, Synops. in Griff. An. King., ix, 20.

Sphargis coriacea Gray, 1831, Cataphraeta 51; Dum.Bibr., 1835, Erp.Gen., ii, 560; Bell, 1839, Brit. Rept., 11; Holbr., 1842, N. A. Herp., ii, p. 45, pl. vi; Gray, 1844, Cat. Tort., 51; Bell, 1849, Brit. Rept., 12; Gosse, 1851, Jamaica, 306; Gray, 1855, Cat. Sh. Rept., 71; Agassiz, 1857, Contr., i, 373; Gray, 1864, Pr. Zool. Soc.; Gray, 1870, Suppl. Cat. Sh. Rept., 119, f. 40.; Gray, 1873, Pr. Zool. Soc., 411; Gray, 1873, Hand-list, 96; Goode, 1877, Am. Jour., xiv, 290; Bonap., Fauna Ital.; Jenyns, Brit. Vert., 290; Gervais, Nouv. Arch. Mus., viii, pp. 199-223, pl. 5-9.

Testudo tuberculata Gravenh., 1829, Rept. Mus. Vrat., 9.

Dermochelys atlantica (Les.) Cuv., 1836, Règn. Anim., i, 367; Cuv., 1829, Règn. Anim.

Dermatochelys porcata Wagl., 1830, Syst. Amph., 133, atl., pl. i, f. 1-23, ix, f. 10; Fitz., 1843, Syst. Rept., 30.

Corindo coriacea Flem., Brit. Anim., 149; Harl., 1827, Amer. Herp., 83; Harl., 1827, Jour. Ac. N. Sc. Phil., v, 399.

REFERENCES UNDER VARIOUS NAMES: Delafont, 1729, Mem. Acad., 8; Borlase Cornwall, 287, pl. 27; Catesby, 1743, Carol., ii, 40; Bodd., 1761, Gaz. Santé, No 6; Fongeroux, 1765, Hist. Acad. Sci., 44; Daub. Encycl. Meth., 1784-92; Penn., Brit. Zool., iii, 7; Amoreux, Jour. Phys., 1778, p. 65; La C., 1783, Quad. Ovip., i, 111, pl. 5; Bonn., 1789, Encycl. Meth., pl. 4, f. 2; Donnd., 1793, Zool. Beitr., iii, f. 2; Bechst., 1800, Ueb. La C. Quad. Ovip., 135; Bosc, 1816-19, Nouv. Diet., vol. 34, 257; Cuv., Règn. Anim., ii, 14.

Var. *Schlegelii*.

Hab.—Tropical Pacific and Indian Oceans.

Sphargis coriacea Bleeker, 1857, Nat. Tijds. Ned. Ind., 471.

Dermatochelys coriacea Theobald, 1868, Jour. Linn. Soc., x, 20; Theobald, 1876, Rept. Ind., 34; Swinhoe, 1870, Pr. Zool. Soc., 409; Krefft, 1871, Austral. Ver-tebr., 39.

Sphargis mercurialis Temm. & Schl., 1838, Faun. Jap., Chelon, pl. 1-3; ? Smith, 1849, Zool. S. Africa, App., p. 2.

PART VII.

ANNELIDA FROM BERMUDA,

COLLECTED BY G. BROWN GOODE.

BY

Professor H. E. WEBSTER,
OF UNION COLLEGE, SCHENECTADY, N. Y.

ANNELIDA FROM BERMUDA.

Fam. AMPHINOMIDÆ.

HERMODICE *Kinberg.*

Öfvers. Kong. Vetensk-Akad. Förhand., p. 11, 1857.

HERMODICE CARUNCULATA *Kinberg.*

(Plate VII, Figs. 1-5.)

- Nereis gigantea* LINNÆUS. Syst. Nat. ed. 12, vol. i, p. 1086. 1776 (teste Baird).
Aphrodita carunculata PALLAS. Miscell. Zoöl. p. 102, pl. viii, figs. 12, 13. 1766 (teste Quatrefages).
Terebella carunculata GMELIN. Linn. Syst. Nat., vol. i, p. 3113. 1789.
Amphinome carunculata BRUGIÈRE. Enc. Méth., art. Amphinome, p. 46. Atlas, pl. 60, figs. 6, 7. 1789 (t. Baird).
Amphinome carunculata CUVIER. Dict. des Sci. Nat., art. Amphinome, vol. ii, p. 72.
Amphinome carunculata GRUBE. Fam. der Ann., pp. 40 and 122. 1851.
Amphinome carunculata QUATREFAGES. Hist. Nat. des Ann., vol. i, p. 395. 1865.
Amphinoma carunculata AUDOUIN ET M. EDWARDS. Littoral de la France, vol. ii, p. 123. 1834.
Pleione carunculata SAVIGNY. Syst. des Ann., p. 61.
Pleione carunculata LAMARCK. An. sans Vert. 1st ed., vol. v, p. 330; 2d ed., vol. v, p. 572 (t. Baird).
Pleione carunculata CUVIER. Règne Animal, vol. iii, p. 199, ed. Crochard, Annélides pl. 8, figs. 4, 4 A.
Pleione carunculata GRUBE. De *Pleione carunculata*. 1837.
Pleione carunculata TREVIRANUS. Beob. aus der Zoöl., p. 53, pl. xi. 1839.
Hermodice carunculata KINBERG. Öfvers. Kongl. Vetensk-Akad., p. 13. 1857.
Hermodice carunculata BAIRD. Linnean Society, Journal, Zoöl., vol. x, p. 219, pl. iv, figs. 3 a, b. 1868.

There is a series of short flattened setæ along the anterior margin of the ventral ramus, from ten to fifteen in number, which seems not to have been observed.

The dorsal setæ are quite long, very delicate, simple, capillary.

The ventral setæ are much shorter than the dorsal, differ much in length, diameter, and number of teeth found along their outer third.

Some are bluntly rounded and curved at the apex; others have a single blunt tooth just back of the apex, on the side opposite the series of teeth.

EURYTHOË *Kinberg.*

Öfvers. af Kongl. Vetensk-Akad. Förhandl., p. 13. 1857.

EURYTHOË MACROTRICHA Baird.

(Plate VII, Figs. 6-9.)

Amphinome macrotricha SCHMARDA. Neue Wirbell. Thiere, vol. i, part 2, p. 144, figs. a, b, c, in text, and pl. xxxiv, fig. 290. 1861.

Amphinome macrotricha QUATREFAGES. Hist. Nat. des Ann. vol. i, p. 406. 1865.

Eurythoë macrotricha BAIRD. Linnean Society, Journal, Zool., vol. x, p. 225, pl. iv, figs. 5 a, b. 1868.

Schmarda's description of this species is very short, and I am without information as to the original color of the specimens sent me. The reference, however, is probably correct. On the anterior margin of the ventral ramus is a series of short, flattened setæ, 6 to 9 in number (Fig. 9). The ventral setæ are not so much curved externally as in Schmarda's figure.

The collection includes a single specimen belonging to this family, too much injured for identification.

Fam. CHRYSOPETALIDÆ.

BHAWANIA *Schmarda.*

Neue Wirbellose Thiere, vol. i, part ii, p. 164. 1861.

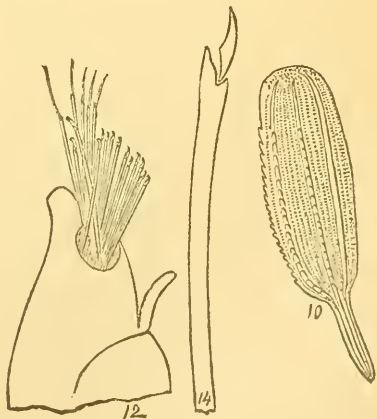
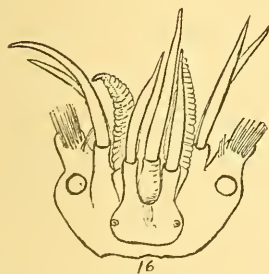
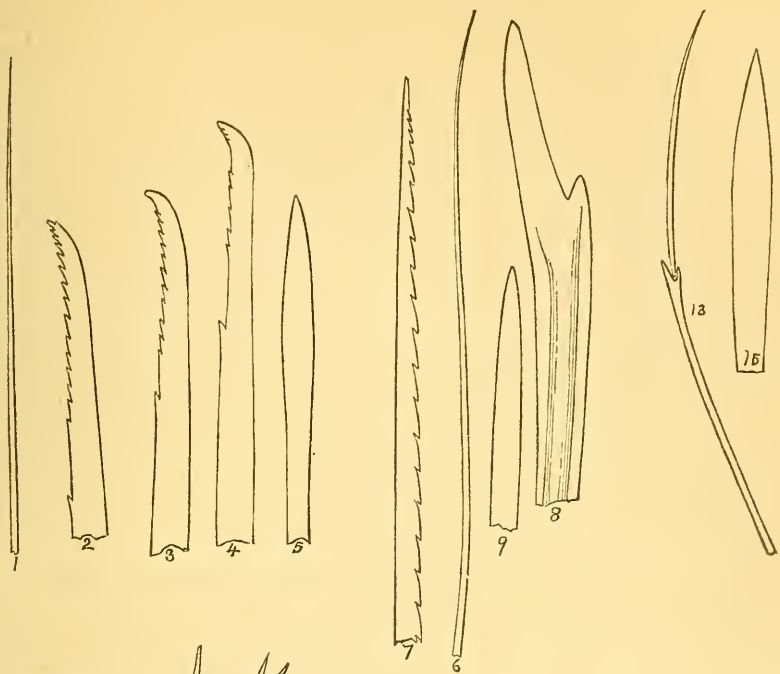
BHAWANIA GOODEI *n. sp.*

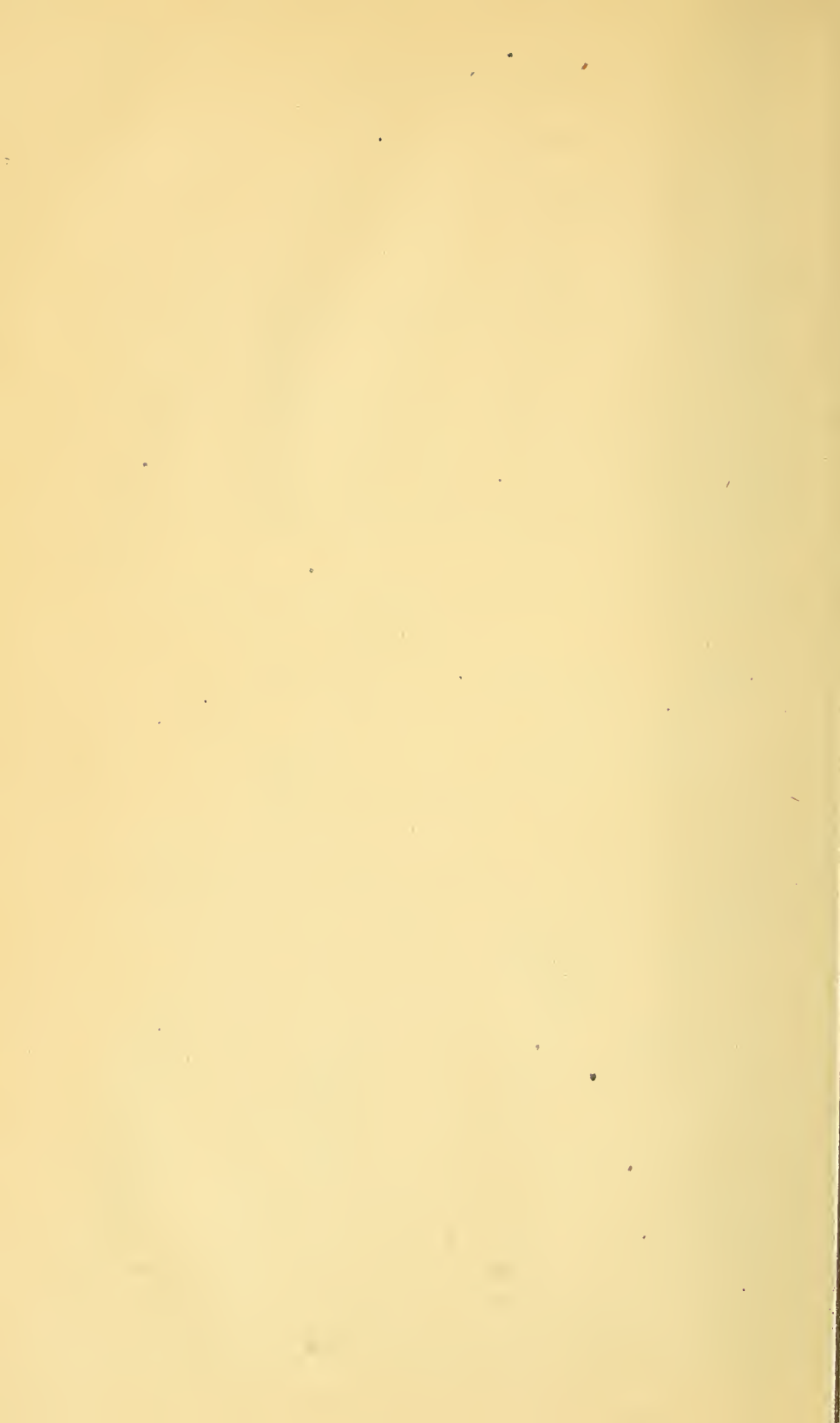
(Plate VII, Figs. 10-15.)

No good view of the head was obtained. The anterior segments curve directly forwards, embracing the head and reaching beyond it; palæ and setæ both projecting far beyond it, and in alcoholic specimens it seems impossible to free the head from the surrounding parts.

On the ventral surface there is an oval caruncle reaching through five segments, its length about double its breadth.

The palæ (Fig. 10) are broadly rounded externally, sides slightly convex, attached by a long narrow process. The inner edge is denticulated to near the end. The surface is covered by numerous longitudinal raised lines, of which three are wider than the others. All these lines, except the outer one of the wide lines, are covered with raised scales, which are very numerous and small on the narrow lines, presenting, when moderately magnified, the appearance of series of beads. The external wide band is smooth. Some of the raised lines are continued on the insertion plate. The palæ are very numerous; from the middle line of each lateral half of the body they curve—the external, outward; the internal, inward. Fig. 10 represents one of the palæ taken from about





the middle line of the body; passing from this line outward they become somewhat narrower.

Feet biramous; ventral ramus (Fig. 12) a little longer than the dorsal, curved upward, tapering slightly from base to apex, bluntly rounded externally. It carries a finger-shaped cirrus which originates near the base of the ramus. Dorsal ramus (Fig. 11) somewhat conical, truncated externally, and bearing a short cirrus, which arises near the center of the truncated surface. The two rami are very close to each other. Setæ of the ventral ramus of two kinds, both compound; in the upper part of the bundle from two to six, elongate (Fig. 13), delicate, with long capillary appendix; all the others much shorter (Fig. 14), stouter, with short appendix. Setæ of dorsal ramus (Fig. 15) from ten to fifteen in number, all of one kind, thin, pointed, flattened, widest near the center; they arise from the upper side of the ramus. The anterior segments curve forwards, forming semicircles. All the segments are very narrow. After the fifth segment the body has a uniform diameter to the posterior third, after which it tapers uniformly to about one-half the greatest width. The falling off in width is also rapid along the first five segments.

Color, in alcohol, pale light-yellow; ventral surface yellowish, or reddish-brown.

Body slightly convex above; flattened below.

Length (largest specimen), 50^{mm}.

Width, 3^{mm}.

Specimen only 10^{mm} in length were also 3^{mm}, or even 3.5^{mm}, in width.

Fam. POLYNOIDÆ.

HALOSYDNA *Kinberg*.

Öfversigt Kongl. Vetensk-Akad. Förhand., p. 384. 1855.

HALOSYDNA LEUCOHYBA (*Schmarda*).

(Plate VII, Figs. 16-18. Pl. VIII, Figs. 19, 20.)

Polynoë leucohyba SCHMARDA. Neue Wirbellose Thiere, vol. i, part ii, p. 153, figures in text a, b, c, pl. xxxvi, fig. 308. 1861.

Polynoë leucohyba QUATREFAGES. Hist. Nat. des Ann., vol. i, p. 251. 1865.

? *Antinoë leucohyba* BAIRD. Linnean Society, Journal, vol. viii, p. 193.

The width of the head, back of the bases of the antennæ, exceeds the length (Fig. 16). The head is slightly convex above, with a central depression extending about one-half of the way back from the anterior margin; sides strongly convex; posterior margin straight; bases of the lateral antennæ as long as the rest of the head.

There are, probably, four eyes, but in the alcoholic specimens only two could be seen; these were lateral, circular, large, on the median line.

Antennæ smooth, cylindrical to near the apex, then tapering suddenly; median antenna about one-third longer than the lateral.

Superior tentacular cirrus about equal in length to the median antenna; inferior cirrus as long as the lateral antennæ.

Palpi triangular, stout, tapering uniformly to near the end, terminating in a small conical process; their margins are scalloped, and their surfaces thrown into folds by deeply impressed lines; length about that of the lateral antennæ.

There are eighteen pairs of elytra. (Schmarda gives seventeen in the text; in the figure, seventeen on one side, eighteen on the other). The first pair, circular; the others, oval (Fig. 18); slightly emarginate along the anterior margin; covered with small, white, rounded papillæ on their exposed surface, becoming more numerous on the posterior elytra.

The feet are quite stout; dorsal ramus (Fig. 17) minute; ventral ramus divided into two parts by slight longitudinal constrictions; dorsal cirri arising from stout basal articles, reaching a little beyond the ventral setæ; ventral cirri of first pair as long as the dorsal cirri, and similar to them in all respects, directed forwards. After the first pair they arise from minute basal articles, are fusiform, reach to the end of the ventral ramus.

There are from 6 to 10 dorsal setæ (Fig. 20), short, acute, broad at base, transversely serrate. Ventral setæ (Fig. 19) stout, bi-dentate, except those of the first segment, which end in a single point. They are in two bundles, but are all of one kind.

Exposed part of elytra, blue; covered part, grayish-white; papillæ of elytra, white; body, beneath the elytra, blue; anterior part of head and bases of elytra, blue; posterior part of head with numerous black pigment spots; feet and ventral surface, yellowish-white; dorsal cirri with a blackish band near the base, and another about two-thirds of the way out.

I refer the specimens sent me by Mr. Goode to *Polynoë leucohyba* SCHMARDA, though it will be seen that the figures differ, especially those of the setæ. Baird has doubtfully referred this species to *Antinoë* KINBERG, but Fig. 16 shows that it cannot be so referred. Schmarda says nothing about the head.

Fam. HESIONIDÆ.

FALLACIA *Quatrefores*.

Hist. Nat. des Ann., vol. ii, p. 93. 1865.

FALLACIA PROCTOCHONA (*Schmarda*) *Qtrfg*.

(Plate VIII, Fig. 21.)

Hesione proctochona SCHMARDA. Neue Wirbellose Thiere, vol. i, part ii, p. 79, figure of seta in text, and pl. xxviii, fig. 226. 1861.

Fallacia proctochona QUATREFAGES. Hist. Nat. des Ann., vol. ii, p. 99. 1865.

At first it seemed that it would be necessary to institute a new genus for this species. Afterwards two minute papillæ were found on the anterior angles of the head, which are doubtless rudimentary antennæ. As they are too small to be seen even with an ordinary hand magnifying glass, it is not surprising that Schmarda failed to mention them. Mr. Goode collected nine specimens of this species, and the museum of Union College has a large number of specimens, collected by myself on the west coast of Florida, from Sarasota Bay to Key West. Schmarda states correctly in the text that there are sixteen tentacular cirri; his figure shows but fourteen. These, like the dorsal cirri, arise from long cylindrical basal articles. From Schmarda's figure they would seem to arise in a linear series; in fact they are in pairs, one above the other. The basal article of the ventral cirri is very short. The upper margin of the foot (Fig. 21) is prolonged into a conical cirrus. According to my Florida notes the antennæ are red. It is impossible to determine from alcoholic specimens how many segments bear tentacular cirri, but there appears to be but one.

The ante-anal segment has no pedal rami, nor setæ, but merely two long cirri, dorsal and ventral.

The anal segment has two long anal cirri, as long as the dorsal cirri. The anal opening is surrounded by a series of low, flattened, projections, with convex external margin, oval in form, about six in number.

It would appear that Schmarda's specimens had lost the anal cirri.

PODARKE *Ehlers*.

PODARKE OBSCURA *Verrill*.

VERRILL. Invert. Animals of Vineyard Sound, etc., p. 589, pl. xii, fig. 61. 1874.

WEBSTER. Annel. Chæt. of the Virginian Coast, p. 216. 1874. Annel Chæt. of New Jersey, p. 107. 1880.

The collection contains a few specimens much injured, but probably belonging to this species.

Fam. NEREIDÆ.

NEREIS Cuvier.

NEREIS BAIRDII, *n. sp.*

(Plate VIII, Figs. 22-28.)

The head of this species (Fig. 22) is quite long, the anterior thirds set off from each other and bounded by lines curving inward; the posterior third with convex sides; posterior margin straight.

Eyes not very large, circular, lateral.

Antennæ about one-half as long as the head, removed from each other, at origin, by less than their own diameter; inserted in slight depressions of the anterior margin of the head; bluntly conical.

Palpi very long, not large, not tapering, with large terminal articles, which, in alcoholic specimens, are nearly spherical.

The buccal segment, in contracted specimens, has the same length as the second segment; probably double that length in life.

The maxillary ring of the proboscis is short (Figs. 22^a, 23); the paragnathi are complete; mostly conical; arrangement, i, irregularly V-shaped; ii, double series, irregular; iii, two transverse, linear series; iv, numerous, irregular; v, sometimes wanting, sometimes one, two, or three, small; vi, on each side a single, narrow, elongated transverse denticle, ends rounded; situated on elevations (Fig. 22) which have straight inner margins; outer margins straight to near the anterior end, when they curve inward; vii and viii in two series, the anterior composed of a few large denticles, the posterior more numerous and smaller.

Tentacular cirri with stout cylindrical basal articles; the cirri themselves delicate; the posterior superior longest, reaching back to the eighth segment; the others much shorter, as shown in the figure.

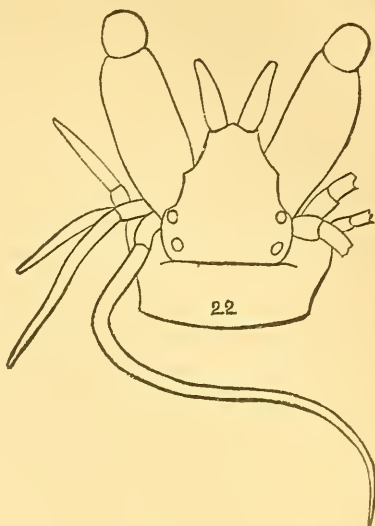
Feet rather stout and short; on the anterior segments (Fig. 24) the lingulæ and rami are nearly of the same length, stout, conical. Dorsal cirrus arising from the upper margin of its lingula, stout, conical, not reaching quite to the end of the lingula. Ventral ramus bi-labiate; anterior lip a little longer than the posterior. Ventral cirrus arising just within the base of its lingula, delicate, finger-shaped, nearly as long as the lingula. Further back the feet undergo some changes. The superior lingula is enlarged (Fig. 25), the dorsal cirrus moves nearer the apex of its lingula, and on the extreme posterior feet becomes a little more delicate (Fig. 26.) The dorsal ramus becomes smaller, more sharply conical. The ventral ramus shortens, especially its anterior lip. The



19



20



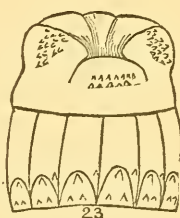
22



27



22a



23



24



21



24a



25



26



26a



28

ventral lingula retains its length but loses in diameter. The ventral cirrus remains unchanged. Other specimens, certainly belonging to this species, have the feet more delicate, the dorsal and ventral cirri a trifle longer. (Figs. 24^a, 26^a.)

Anal cirri filiform, as long as the last ten segments.

In the dorsal ramus there are from 6–10 setæ (Fig. 28) with long delicate appendix, the terminal points of the stem equally long. These setæ form the upper part of the ventral bundle, while its lower part is made up of falcate setæ, appendix short (Fig. 27), terminal points of stem very unequal in length.

Body convex above, slightly convex below; of nearly uniform width for the anterior three-fourths; tapering slightly along the posterior fourth, but appearing to retain a uniform diameter, on account of the lengthening of the feet. A few of the anterior segments also taper slightly.

Length, 35–50^{mm}.

Width, 3–4^{mm}.

Number of segments, 50–80.

NEREIS GRACILIS, *n. sp.*

(Plate IX, Figs. 29–35.)

Head wide (Fig. 29), slightly convex laterally and above, a little concave behind, produced in front to form the bases of the antennæ.

Eyes quite large, placed well in front; those on either side nearly in contact.

Antennæ with long cylindrical basal articles, produced from the head, just within the anterior eyes; they are long, conical.

Palpi long and stout, curved inward near the base; terminal articles quite long; in contracted specimens they fall a little short of the antennæ.

Proboscis and jaws not seen.

On the specimen figured, which was otherwise in good condition, the posterior superior tentacular cirri were both lost. On another specimen, much injured, this cirrus remained, and was found to be very long, reaching back to the thirty-fourth segment, being nearly three times as long as the anterior superior cirrus, which reaches to the twelfth segment; the inferior cirri are much shorter.

Buccal segment produced forward along its anterior margin, encroaching a little on the head; its length, in alcoholic specimens, is about that of the next segment.

The dorsal cirri are very long and delicate; they have a stout basal article, which, on the anterior segments, is merged in the base of the upper lingula (Fig. 30); further back the lingula has the appearance of arising from the base of the cirrus (Figs. 31, 32). The dorsal cirri increase in length gradually, backward, and appear to gain much more than they really do, owing to the shortening of the other parts of the foot.

On the anterior segments the free portion of the upper lingula (Fig. 30) is about one-third as long as the dorsal cirrus, delicate, conical. The upper ramus is as long as the free part of the upper lingula, but falls a little short of its apex; in form it is like the lingula. The ventral ramus is bi-labiate, the anterior lip much the longest, conical, and minute at extremity (Fig. 30); basal three-fourths stout, with strongly convex sides. The posterior lip is very broad, completely concealing the base of the anterior lip in a posterior view (Figs. 30, 32); sides nearly straight, apex bluntly and irregularly rounded. The inferior lingula is long, conical, swollen at base. The ventral cirrus arises some distance within the base of the ventral lingula, and reaches nearly to its apex; it is very delicate, conical.

There is a progressive diminution in size of all parts connected with the feet from before backward, with the exception of the cirri; the lingulae, especially, become much smaller, falling short of the rami; but the cirri elongate, the ventral cirrus finally reaching beyond both lingula and ramus.

The setae are of three kinds: those of the dorsal ramus for the most part with delicate capillary appendix; the points of the stem nearly equal in length (Fig. 33); with these, in the lower part of the bundle, a few falcate setae (Fig. 35); in the ventral ramus there are two bundles of setae; the upper bundle is composed mostly of setae with appendix similar to those of the first kind, but with one of the terminal points of the stem much longer than the other (Fig. 34); there are also a few of the other two forms; the setae of the lower bundle are mainly falcate (Fig. 35), with also a few similar to Fig. 34.

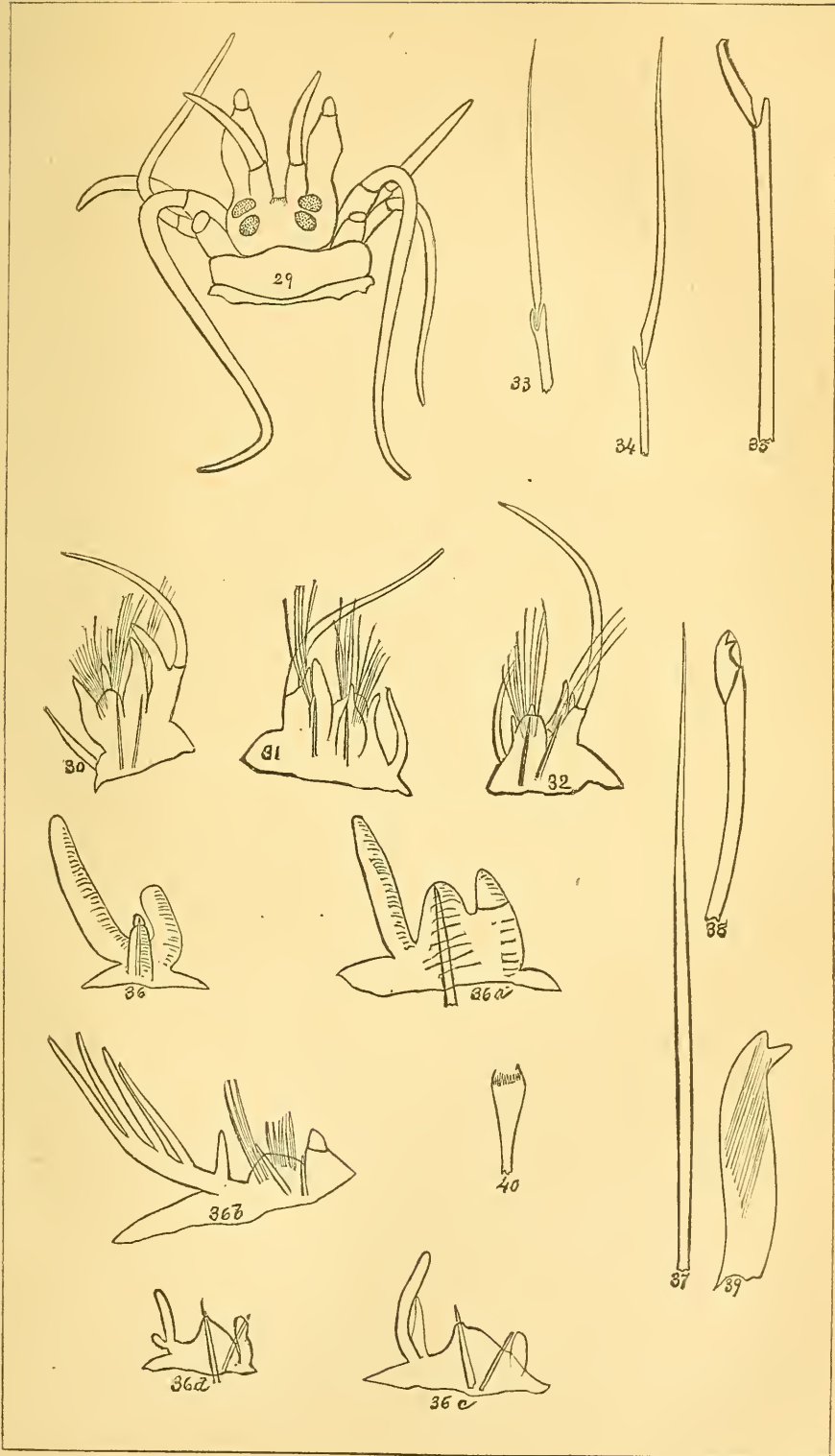
Anal segment simple, cylindrical; anal cirri as long as the dorsal cirri, and like them in all respects.

Body strongly convex above; slightly convex below; tapering a little along a few of the anterior segments, and also along the posterior third.

Length of only entire specimen, 60^{mm}.

Width, 4.5^{mm}.

Number of segments, 92.



Fam. EUNICIDÆ.

EUNICE *Cuvier*.EUNICE MUTILATA, *n. sp.*

(Plate IX, Figs. 36, 36a-d—40.)

This species is represented in Mr. Goode's collection by an anterior fragment composed of 39 segments, length 30^{mm}; and by a posterior fragment, 180 segments, length 90^{mm}. These may have belonged to the same specimen, but do not make up the whole of any specimen, an intermediate part, of unknown length, being lost.

The head is distinctly and deeply bi-lobed.

The antennæ rather delicate, cylindrical, smooth, bluntly rounded at apex; median antenna 3.5^{mm} in length, reaching back to the middle of the fifth (third setigerous) segment; inner pair, length 3^{mm}; outer pair a mere trifle shorter than the inner.

Eyes small, black, circular, between the bases of the paired antennæ.

Buccal segment equal in length to the three segments following it, taken together; second segment a little shorter than the third.

Tentacular cirri as long as the buccal segment, conical, apex blunt.

The branchiæ begin on the seventh setigerous segment; on the seventh, eighth, and ninth segments, a single filament; on the tenth, eleventh, and twelfth, two filaments; on the thirteenth, fourteenth, and fifteenth, three filaments; from the sixteenth to the thirty-seventh, four filaments (Fig. 36b); on the posterior fragment the branchiæ have but a single filament (Fig. 36c), becoming very delicate and short on the posterior segments (Fig. 36d).

The dorsal cirri, largest on the first setigerous segment (Fig. 36), growing progressively smaller (Fig. 36b); at first finger-shaped, then conical. On the first segment of the posterior fragment this cirrus shows considerable increase in length, but is shorter than the branchia (Fig. 36c); while on the last segments (Fig. 36d), though the length of the cirrus is about the same, it is much longer than the branchia.

The ventral cirri are stout, conical, base swollen; outer third, on anterior segments, cut off by a shallow constriction; longest on first segments.

Anal segment cylindrical, small. Anal cirri short.

The upper (capillary) (Fig. 27) setæ are very long and delicate; longest on the posterior third. The comb-like setæ (Fig. 40) have their outer

teeth prolonged. The setæ of the lower bundle are compound, longer on the posterior segments than in front; apex (Fig. 38) bi-dentate.

In the anterior rami there is but one acicula, simple, pointed, projecting a little beyond the foot; afterwards a second acicula is added (Fig. 39), curved within the ramus, ventral, apex bluntly bi-dentate, projecting.

The body is strongly convex above, flattened below.

The width at the fifteenth segment, 5^{mm}; tapering very gradually in both directions, giving on the posterior segments a width of 1.5^{mm}.

The color, in alcohol, is light reddish-brown, with indications of a white band on the posterior half of the fourth setigerous segment. On the posterior segments the color is dark reddish-brown.

There are numerous gray specks on the entire surface.

EUNICE DENTICULATA *n. sp.*

(Plate X, Figs. 41, 41 a, b-45.)

Head distinctly bi-lobed; lobes flattened, broad; antennæ short, delicate, about one-third longer than the head, smooth, conical, equal.

Buccal segment about the length of the next three. Second segment not plainly separated from the buccal, when seen from above.

Tentacular cirri delicate, conical, about one-half the length of the buccal segment.

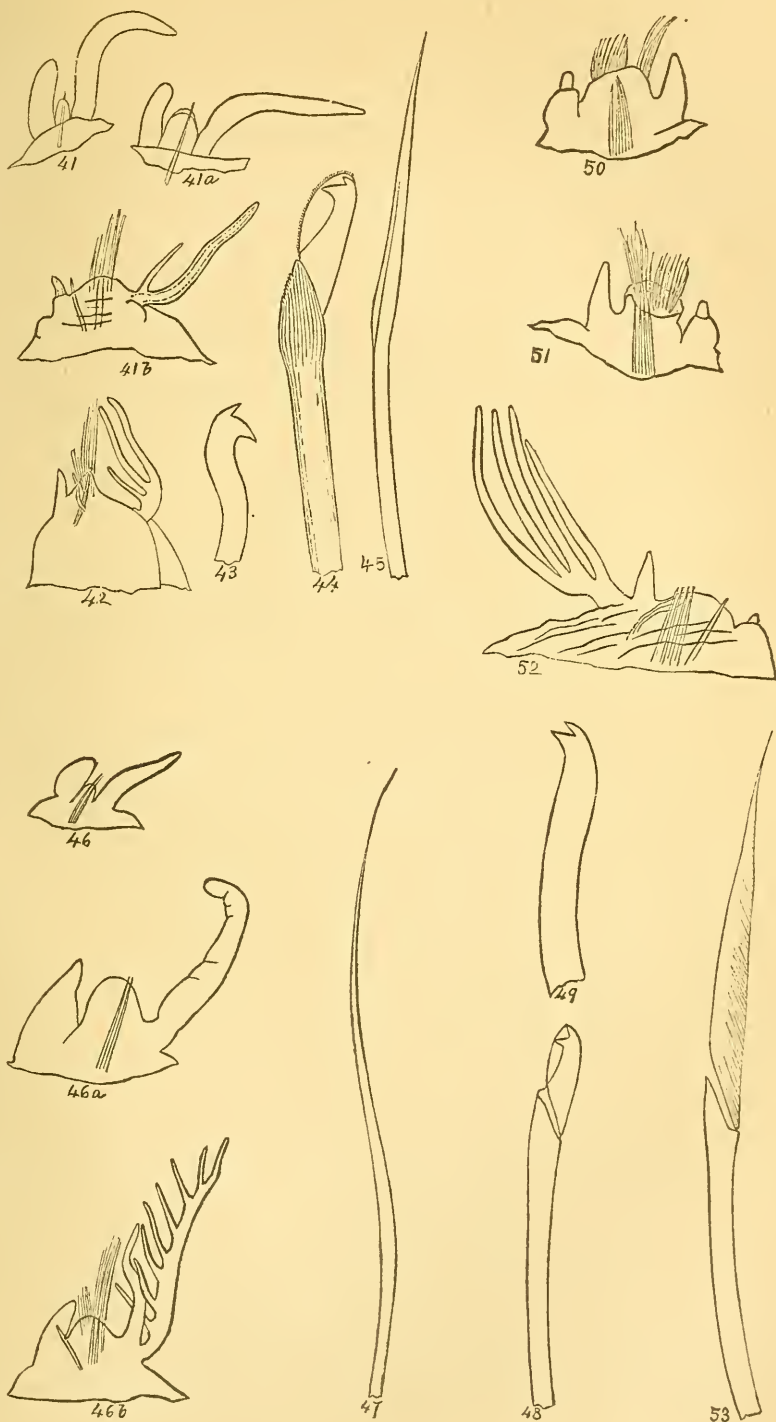
Dorsal cirri long and stout on the non-branchiated segments (Figs. 41, 41a), very delicate on the segments with branchiæ (Figs. 41b, 42), and arising from the side of the branchial stem.

The ventral cirri are quite long on the anterior segments (Figs. 41, 41a); after the first few segments they have a swollen base (Fig. 41b), but this is lost further back (Fig. 42).

The branchiæ appear at about the middle third, and for a large number of segments consist of a single filament (Fig. 41b); at about the beginning of the last third another filament is added, while on the posterior segments there are three.

The capillary setæ (Fig. 43) have a long cylindrical inner part; a short, wide, flattened, outer part, tapering suddenly to a sharp point.

The compound setæ (Fig. 44) have a small, outer tooth; a large, stout, inner tooth. When highly magnified the stem shows a series of minute denticulations along one margin, near the appendix, and the membrane of the appendix shows an incised margin.



The lower acicula (Fig. 45) is curved externally, and has two sharp, triangular, teeth, of which the lower is very large.

Body slightly convex above, flattened below; segments numerous, short; on the largest specimen, at the widest part of the body, there were four segments, in a length of 1^{mm}.

Anal cirri lost on all our specimens. Color in alcohol, uniform yellowish-white.

Length of longest complete specimen, 60^{mm}.

Width, 3^{mm}.

Another specimen, posterior part lost, had a width of 4^{mm}.

The specific name is given in reference to the denticles on the stem of the compound setæ.

EUNICE LONGISETIS n. sp.

(Plate X, Figs. 46, 46 *a*, *b*-49.)

Head four-lobed, upper lobes small; antennæ smooth, median and median lateral reaching back to the fifth segment; lateral about one-half as long as the median.

The dorsal cirri are long and stout (Figs. 46, 46*a*, *b*,) on the branchiatal segments, arising just at the base of the branchial stem.

Ventral cirri stout, reaching beyond the foot. Branchiæ begin on the sixth setigerous segment, at first as a single filament, delicate, shorter than the dorsal cirrus; further back the number of filaments increases to eight, carried on the side of a stout stem, which is nearly double the length of the dorsal cirri; on the posterior segments they become reduced to the same condition as on the anterior, but persist to the end.

The capillary setæ are very long, reaching nearly to the end of the dorsal cirri (Fig. 47); the compound setæ are about one-half as long as the capillary, terminal teeth sharp (Fig. 48), nearly at right angles to each other.

In the upper part of the foot are two or three sharp aciculæ, projecting slightly; in the lower part, and extending into the ventral cirrus, a single, curved, bi-dentate acicula (Fig. 49).

Body convex above; flattened below; anal segment short; anal cirri two, in all respects similar to the dorsal cirri.

Color (in alcohol), dark reddish-brown. Fourth setigerous segment white. Antennæ, tentacular cirri, and dorsal cirri evidently banded with white and some other color in life, but with only slight traces of such marking remaining. Aciculæ black.

Buccal segment as long as the four following segments together; second segment short, not well defined above; tentacular cirri about one-half the length of the buccal segment.

Number of segments, 107.

Length, 40^{mm}.

Greatest width, 4^{mm}.

EUNICE LONGICIRRATA n. sp.

(Plate XII, Figs. 75-80.)

Head distinctly four-lobed; upper lobes narrow, but somewhat elongated. Median antennæ reaching back to the eleventh segment; median lateral also long, reaching to about the eighth segment; lateral about one-half as long as the last. They are all very delicate, smooth.

The buccal segment is as long as the next three segments. The second segment is nearly as long as the third, plainly set off from the first both above and below; its tentacular cirri are very delicate, acutely conical, reaching forward to the middle of the head.

The dorsal cirri on the anterior segments are large and long (Figs. 75-77), irregularly wrinkled; they diminish in size very gradually backward to the middle of the body; behind the middle they again gain in diameter and length, but are never so large as on the anterior segments.

The branchiæ begin as a single filament on the third setigerous segment (Fig. 76); on the next segment they have 6 subdivisions, on the next from 12 to 15. This number they retain to about the thirty-third segment; then for the next ten segments the filaments gradually become fewer; from about the forty-third to the fifty-third there is but one filament; after this they disappear. The branchiated segments form about one-third the length of the body.

The anal cirri are in two pairs; one quite short, blunt; the other as long as the last twelve segments taken together, every way similar to the antennæ.

The bidentate setæ have the form shown in Fig. 79; the outer tooth is quite long, bluntly rounded at apex; the lower sharp, triangular.

In the anterior segments there is one stout, projecting acicula, in the upper part of the foot; presently another is added; still further back a bi-dentate acicula (Fig. 80) appears, in the lower part of the foot, followed quickly by another of the same kind. Delicate setæ penetrate the base of the dorsal cirri.

The general color of the body (in alcohol) is yellowish-white; beautifully iridescent.

Body strongly convex above; flattened below.

Length (about), 110^{mm}.

Greatest width, 4^{mm}.

There is a gradual diminution of diameter along the posterior third.

EUNICE VIOLACEA Grube.

Eunice violacea, Grube. Annulata Örstediana p. 57. 1856.

Eunice violacea Quatrefages. Hist. Nat. des Annel., vol. i, p. 325. 1865.

Eunice Roussæi Ehlers. Die Borstenwürmer, p. 309. 1868.

Ehlers' identification of *E. violacea* Grube with *E. Roussæi* Quatr. seems at best very doubtful. In the former, the branchiæ appear on the sixth segment; in the latter, on the tenth, and both descriptions seem to have been made from adult forms. Our material is hardly sufficient to decide the question positively.

MARPHYSA Quatrefages.

MARPHYSA ACICULARUM n. sp.

(Plate X, Figs. 50-53.)

Head broad, distinctly bi-lobed; lobes very broadly rounded in front; antennæ smooth, tapering but little; median and median pair about three times as long as the head; lateral pair a little shorter than the last; eyes two, black, between the bases of the paired antennæ.

Buccal segment double the length of the following segment; second segment a trifle shorter than the third.

Dorsal cirri (Figs. 50-52) stout, conical, retaining about the same length throughout; ventral cirri on the anterior half of the body borne on a stout cylindrical process, which becomes smaller on the posterior part of the body.

The branchiæ begin (on adult specimens) on the twenty-fifth to twenty-ninth setigerous segment, at first as a single filament, shorter than the dorsal cirrus. The filaments soon increase in number to four (Fig. 52), but on the posterior segments become again reduced to one very minute filament.

The superior (capillary) setæ are about double the length of the inferior, and of the ordinary form. The form of the inferior setæ is shown in Fig. 53.

There are from three to five sharp, black aciculæ in each foot, scarcely projecting.

The first ten segments are rounded; their length a little more, their diameter a little less, than that of the segment following. After the tenth segment the body is much depressed; very slightly convex above, flat below; along the posterior third the body is somewhat more convex, and diminishes gradually in diameter.

Length, 120^{mm}.

Greatest width, 6^{mm}.

Color (in alcohol), dirty white, somewhat iridescent.

NICIDION Kinberg.

NICIDION KINBERGI n. sp.

(Plate XII, Figs. 81-88.)

This genus is represented in Mr. Goode's collection by a single specimen, of which the posterior segments are lost. What remained is in good condition, and it seems desirable to describe it, as well as may be, because so few species of the genus have been found.

The head (Fig. 81) is bi-lobed, convex above and at the sides; the median antenna reaching back to the third segment; the paired antennæ a little shorter than the median; eyes small, circular, black, situated back of the origin of the lateral antennæ.

The buccal segment is nearly as long as the three following segments together; the second segment perfectly well marked, as long as the third; the tentacular cirri were lost, merely a short basal part remaining.

The dorsal cirri on the anterior segments are stout, irregularly and bluntly conical (Figs. 82, 83); further back they become somewhat smaller (Fig. 84). The ventral cirri on a few of the anterior segments (Fig. 82) are as long as the dorsal, finger-shaped; soon they become much swollen at base (Fig. 83), and then fall off rapidly in size, being hardly perceptible on the posterior segments of our fragment (Fig. 84).

The capillary setæ are widened for a part of their length (Fig. 86), and then drawn out into a delicate capillary termination. The compound setæ have the form shown in Fig. 85. There are many comb-like setæ (Fig. 87), with their teeth curved and prolonged, especially one of the outer teeth.

In the anterior feet there is a single stout acicula, straight, pointed, slightly projecting; further back appears a bi-dentate acicula, in the lower part of the ramus (Figs. 84, 85).

Body strongly convex above, flat or slightly concave below.

Color, in alcohol, white.

Length of seventy segments, 14^{mm}.

Diameter, 1.2^{mm}.

ARABELLA (*Grube*) Ehlers.

ARABELLA OPALINA Verrill.

Lumbriconereis splendida LEIDY. Marine Invert. Fauna of R. I. and N. J., p. 10. 1855.

Lumbriconereis opalina VERRILL. Invert. Animals of Vineyard Sound, in Report of U. S. Commissioner of Fish and Fisheries, Part II, p. 342, pl. xiii, figs. 67, 70. 1874.

Arabella opalina VERRILL. Proc. Acad. Nat. Sci. Phila. for 1878, p. 299.

Arabella opalina WEBSTER. Annel. Chæt. of the Virginian Coast, etc., p. 242. 1879.
Annel. Chæt. of N. J., p. 116. 1880.

This species, on our coast, certainly ranges as far north as Cape Cod, and as far south as Beaufort, N. C.

ÆNONE (*Savigny*) Ehlers.

ÆNONE DIPHYLLIDIA Schmarda.

Plate XII, Figs. 89-91.

Ænone diphyllidia SCHMARDA. Neue Wirbel. Thiere, vol. i, part ii, p. 120, pl. xxxii, fig. 256 (also figures in text). 1861.

Andromache diphyllidia KINBERG. Annulata Nova, p. 571. 1865.

Ænone diphyllidia QUATREFAGES. Hist. Nat. des Ann., vol i, p. 374. 1865.

Ænone diphyllidia EHLERS. Die Borstenwürmer, p. 407. 1868.

In preserved specimens the "frontal tentacles" of Schmarda (Mundpolster, Ehlers) are hardly visible.

The anterior feet with all their appendages are shorter and wider than those further back (Fig. 90). After the first few segments there may be from one to three stout bi-dentate setæ in the lower part of each ramus.

Ehlers' remarks upon this genus and species seem to be accurate in every respect.

Fam. ARICIIDÆ.

ANTHOSTOMA Schmarda.

Anthostoma ramosum SCHMARDA. Neue Wirbellose Thiere, vol. i, part ii, p. 62 (figs. of feet and setæ in text).

The collection contained but one specimen of this species, and that very badly injured, but sufficient for identification.

Bull. Nat. Mus. No. 25—21

Fam. OPHELIIDÆ.

OPHELINA *Örsted*.

Grube, in his *Annulata Semperiana* (p. 193), arranges the genera of this family in the following manner :

Ophelina ÖRSTED; type, *Ammotrypanne aulogaster* RATHKE.

Ammotrypane RATHKE; type, *Ammotrypane limacina* RATHKE.

Ophelia SAVIGNY; type, *Ophelia bicornis* SAVIGNY.

This arrangement seems to be correct, and accordingly the following species has been referred to *Ophelina*.

OPHELINA MACULATA *n. sp.*

(Plate XI, Figs. 54, 55.)

Head as long as the first three segments taken together, terminating in a delicate, elongated, conical process, which is set off by a shallow constriction.

There are three eyes, forming a transverse series, near the posterior margin of the head, very small, the middle one largest. The first segment is quite short; from the first to the seventh the segments increase gradually in length; after the seventh they are of uniform length, except the last four, which are shorter.

The outline of the feet and relative length of the setæ are shown in Figs. 54, 55.

The branchiæ begin on the second segment; on all our specimens there are 24 pairs of branchiæ, with one exception, where there are 24 on one side, 25 on the other, leaving three non-branchiated setigerous segments. It is possible that the branchiæ have been lost from some or all of these segments, as we have but few specimens, and in all the posterior segments are somewhat injured.

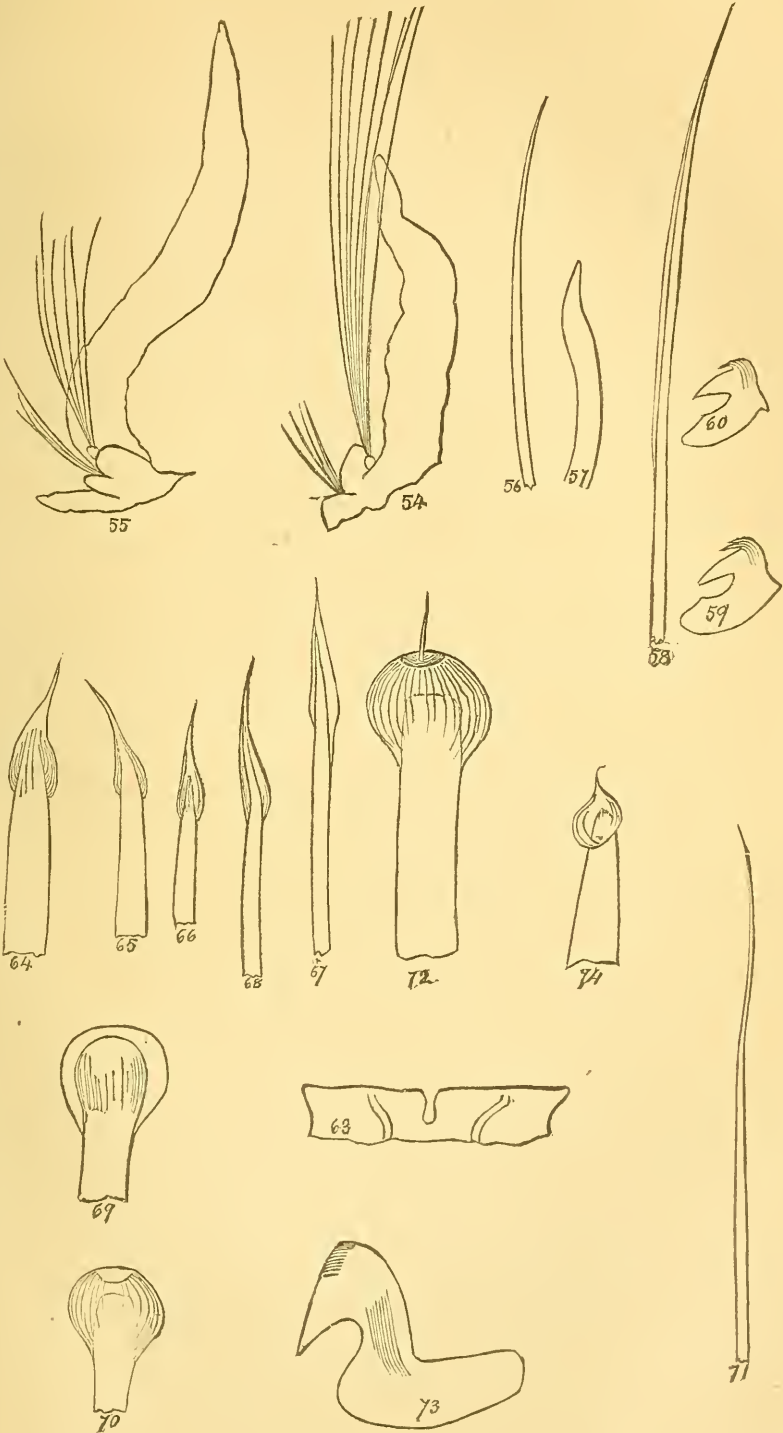
The branchiæ are densely ciliated.

On the seventh segment a circular black spot appears on the side of the segments, close to the origin of the branchiæ. These spots are found on eleven segments; they then become elongated, narrow, and presently disappear.

The general color (in alcohol) is pearl-gray. In every case the anal segment is too much injured to admit of determining the number of the papillæ. A few of them are bi-furcate at extremity.

Length, 19^{mm}.

Width, 2^{mm}.



Fam. THELETHUSIDÆ.

ARENICOLA *Lamarek.*ARENICOLA CRISTATA *Stimpson.*

STIMPSON. Proc. Boston Soc. Nat. His., vol. v, p. 114.

QUATREFAGES. Hist. Nat. des Ann., vol. ii, p. 673. 1865.

The posterior (non-branchiated) segments of this species are set off from each other by deep constrictions.

On the first segment, back of the branchiæ, the feet are represented by two stout conical cirri on either side, distant from each other by about the diameter of the base of each.

On the remaining nine segments there is but a single cirrus on each side, and these pass to the ventral surface, and stand close together.

Fam. CIRRATULIDÆ.

CIRRATULUS *Lamarck.*CIRRATULUS TENUIS *n. sp.*

(Plate XI, Figs. 56, 57.)

Head short, bluntly rounded in front; no eyes. First three segments without setæ or cirri. Third segment a little longer than the fourth; as long as the first two together.

Lateral branchiæ begin on the fourth segment, and exist, on the anterior third of the body, on all segments; not so numerous further back.

Dorsal branchiæ on the fifth, sixth, and seventh setigerous segments, two or three on each side of each segment; not forming a complete transverse series, but leaving a naked median space. Branchial cirri all long, not differing from each other.

The setæ of the anterior segments are capillary in both rami, long, delicate, 7-10 in each fascicle.

At about the fifteenth setigerous segment the ventral setæ begin to be replaced by uncini, and after a few segments the capillary setæ disappear. There are at first three of the ventral uncini; then two; while on the posterior segments there is but one to each ramus. At about the twentieth setigerous segment uncini appear in the dorsal rami; both kinds of setæ remain to the end.

The body is convex above, compressed, flattened below; segments very short but distinctly defined; from the middle the diameter decreases slightly, backward.

Number of segments, 110.

Length, 30^{mm}.

Diameter, 2^{mm}.

Fam. TEREBELLIDÆ.

TEREBELLA (L.) Malmgren.

TEREBELLA MAGNIFICA n. sp.

(Plate XI, Figs. 58-60.)

The tentacles are very numerous, stout, three-fourths as long as the body, even in alcoholic specimens.

The branchiæ of the first pair are large and long (12^{mm}); of the second, one-half the first; of the third, one-half the second: the stem, before giving off branches, forms one-half the length. The branchiæ have numerous brown specks on their stems and branches.

Seven segments, beginning with the second branchiated, have a small, conical papilla or cirrus, placed between the two rami; there is a similar cirrus at a corresponding place on the first branchiated segment.

The ventral surface of the second segment is raised into a thin plate, on either side of the middle line, widening externally; a somewhat similar structure, but not so well marked, occurs on the third and fourth segments. Back of the fourth segment are the ventral plates, sixteen in number, of uniform width, their anterior and lateral margins thickened and separated by an impressed line from the body of the plate. The width of the first plate is five to six times its length; they become progressively narrower, until on the last plate the width and length are about equal. As the ventral plate becomes narrow the uncigerous tori widen.

An impressed line running just in front of the pedal rami divides each segment into two parts; very distinctly above, less so below.

The body retains a uniform diameter to the posterior sixth; after which it tapers somewhat rapidly, the diameter of the anal segment being about one-half that of the middle segments.

Length, 160^{mm}.

Diameter, 8^{mm}.

Number of segments on specimen measured, 135.

Color in alcohol, yellowish-white.

ENOPLOBRANCHUS Verrill.

ENOPLOBRANCHUS SANGUINEUS Verrill.

Chætobranchus sanguineus VERRILL. Invert. Animals of Vineyard Sound, p. 616. 1874.

Enoplobranchus sanguineus VERRILL. Check-List.

Enoplobranchus sanguineus WEBSTER. Annel. Chæt. of the Virginian Coast, p. 263. 1879.

The collection contains a few specimens, all much injured, certainly belonging to this peculiar genus, and probably also to Verrill's species.

Fam. SABELLIDÆ.

PROTULIDES *n. g.*

Branchiæ united along their inner part by membrane.

Setæ of first segment in an oblique double series. Uncini in two series and of two kinds on all segments. Anterior dorsal setæ of two kinds. Collar complete, save for a narrow dorsal incision; not reflexed. Ventral sulcus continued on the dorsum.

This genus is closely related to *Potamilla* MALMGREN, but differs from it in the character and arrangement of the setæ of the first segment, in the continuation of the ventral sulcus on the dorsum, and in having two rows of uncini on the abdominal segments.

PROTULIDES ELEGANS *n. g., n. sp.*

(Plate XI, Figs. 63-74.)

The branchial cirri are from nine to fourteen on each side, base forming a semicircle; they arise from a long undivided basal part, one-half as long as the cirri themselves; pinnæ elongate, delicate; short terminal part of the cirrus without pinnæ.

There are two series of minute eye-specks, one about two-thirds of the way out on the cirri, corresponding to the space occupied by six or seven pinnæ; another, still further out. These eyes cannot be seen in alcoholic specimens.

Tentacles flattened, triangular, length about one-fourth that of the branchiæ.

The first segment is double the length of the second, complete save for a narrow dorsal incision (Fig. 63).

There are from six to eight thoracic segments, the variation in number not depending on size, as some of the largest specimens have but six segments. Posterior segments short; numerous.

The setæ of the first segment are in two series, which run obliquely from before backward, along the entire length of the segment. All these setæ are dilated at the end, and have a capillary apex; they do not differ from each other much in form (Figs. 64-66); there are about forty setæ in each row; they barely project from the surface.

Setæ of remaining thoracic segments of four kinds: In the dorsal ramus, from 4 to 5 long bi-limbate setæ (Figs. 67, 68); below these a double series of short setæ, with dilated globular extremities (Figs. 69, 70) without capillary terminations. In the ventral ramus are the two

forms shown in Figs. 73 and 74; these are arranged in two long series. After the change of setæ (*i. e.*, on the abdominal segments) the uncini remain without modification (Figs. 73, 74); the ventral rami carry a few very long capillary setæ (Fig. 71), and others with dilated end, from the depressed summit of which arises a very delicate capillary appendix or apex (Fig. 72); further back both kinds of ventral setæ become somewhat elongated, and, in particular, the capillary termination of the setæ with expanded ends doubles in length.

The body is convex above, flattened below; of uniform width for the anterior four-fifths, falling off gradually along the posterior fifth to one-half the anterior width.

The base and cirri of the branchiæ are purple, except the base of the superior cirrus on each side, which is white; pinnæ, to the outer margin of the connecting membrane, purple; then, for a short distance, white; next, for a longer distance, purple; followed by another short white series. Terminal pinnæ, purple; naked terminal part of cirri, colorless. Where the pinnæ are white the sides of the cirri are also white, but the dorsum of the cirri is always purple. Young specimens have the cirri umber-brown or brown, with a tinge of purple; pinnæ colorless, white or greenish-white. The first segment has its anterior margin white; dorsum and sides dark umber-brown; ventral surface, for anterior two-thirds same as the dorsum, then a narrow white line, while the posterior part of this surface is dark flesh-color. Remaining thoracic segments, umber-brown; dorsal rami of this part of the body, dark flesh-color. Abdominal segments light flesh-color. On the anal segment two umber-brown spots (? eyes) which cannot be made out in preserved specimens.

This species forms a very tough membranous tube. The description given above is largely drawn from notes on specimens found at Beaufort, N. C., in 1876, by the Union College zoölogical expedition of that year. Most of the specimens found at Beaufort had their tubes imbedded in fragments of a soft oölite just below low-water mark. Two specimens were found with these tubes attached to shells.

A specimen with something over a hundred segments, measured while living, gave—

Length, 26^{mm}.

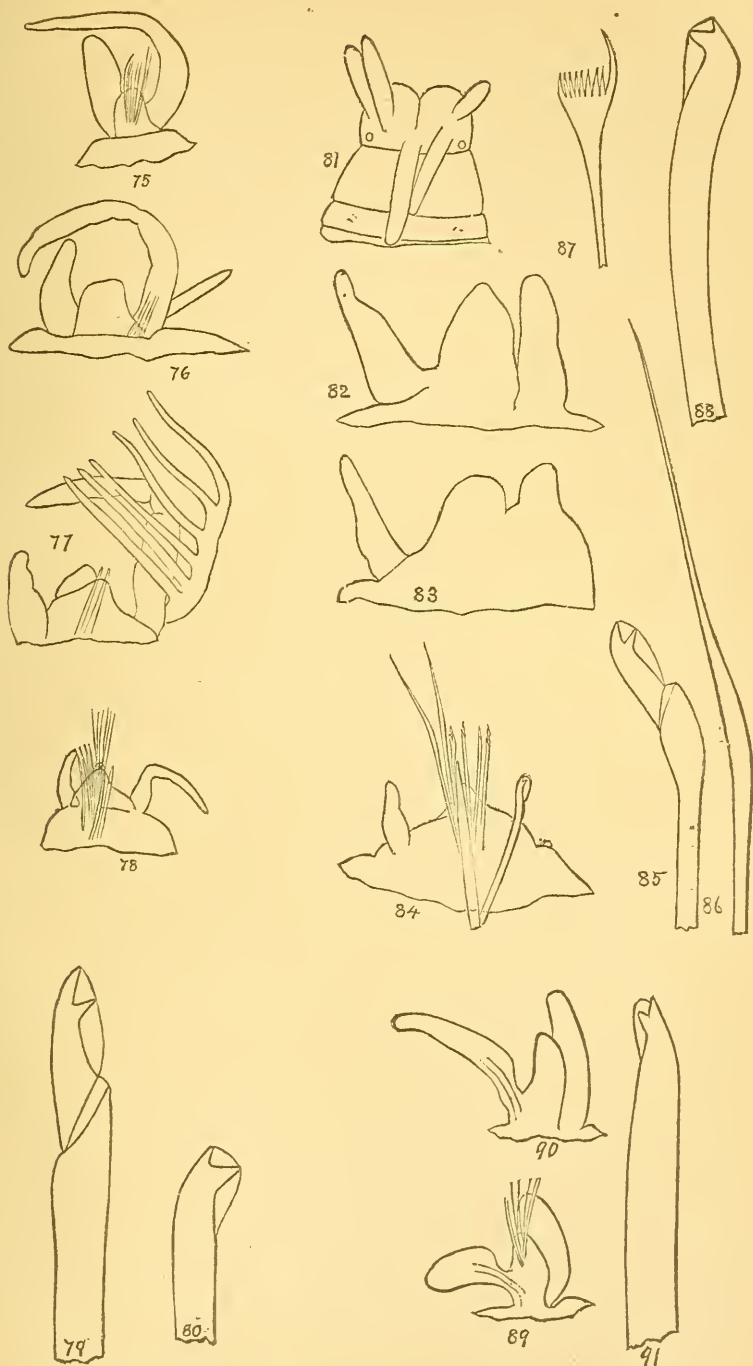
Breadth, 2^{mm}.

From front margin of collar to tip of branchiæ, 5^{mm}.

Another specimen:

Length, 50^{mm}.

Breadth, 35^{mm}.



SABELLA (*L.*) *Malmgren.*SABELLA MELANOSTIGMA *Schmarda.*

The collection contains a single specimen, without branchiæ, and otherwise injured, which probably belongs to Schmarda's species.

Fam. SERPULIDÆ.

HYDROIDES *Gunnerus.*HYDROIDES DIANTHUS *Verrill.*

Serpula dianthus VERRILL. Invert. Animals of Vineyard Sound, p. 620. 1874.

Hydroides dianthus VERRILL. Proc. Acad. Nat. Sci., Phila., for 1878, p. 300.

Hydroides dianthus WEBSTER. Annel. Chæt. of the Virginian Coast, p. 266. 1879; of New Jersey, p. 128. 1880.

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