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### Memoirs of the Museum of Comparative Zoölogy AT HARVARD COLLEGE.

Vol. XLIV. No. 2.

# A CONTRIBUTION TO THE ZOÖGEOGRAPHY OF THE WEST INDIES, WITH ESPECIAL REFERENCE TO AMPHIBIANS AND REPTILES.

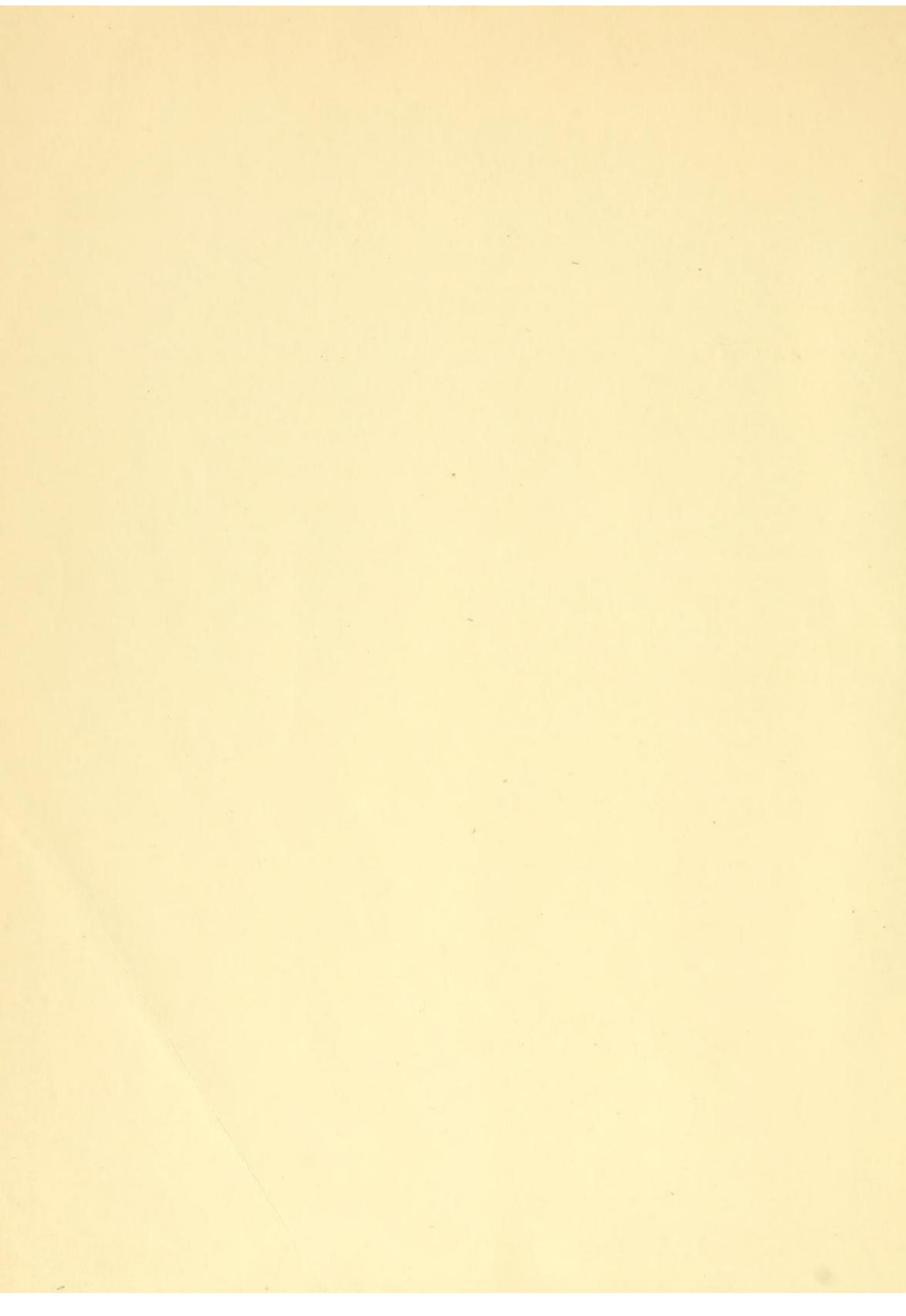
 $\begin{array}{c} \text{BY} \\ \text{THOMAS BARBOUR.} \end{array}$ 

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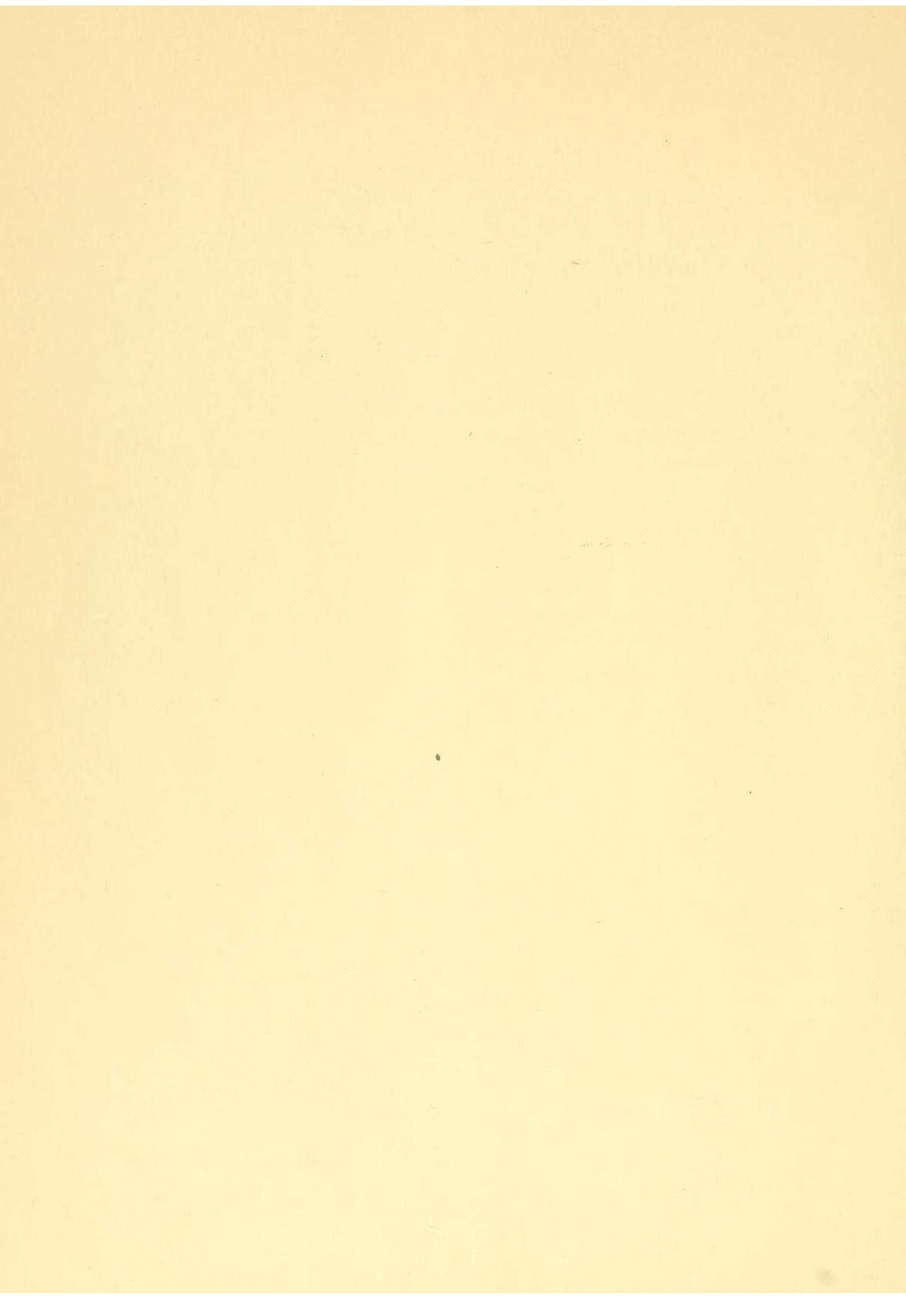
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## A CONTRIBUTION TO THE ZOÖGEOGRAPHY OF THE WEST INDIES, WITH ESPECIAL REFERENCE TO AMPHIBIANS AND REPTILES.

#### INTRODUCTION.

Since its earliest years the Museum of Comparative Zoölogy has received many collections representing the fauna of the West Indian Islands. To mention a few of these, Louis Agassiz and the other scientists on the Hassler collected at St. Thomas, on their memorable voyage; and later — from 1877 to 1880 — the Blake visited very many of the islands. The opportunity to collect upon all of them was eagerly grasped by Mr. Samuel Garman, who was Assistant Naturalist on the Blake during part of the time that she was in charge of Alexander Agassiz. Collections were procured upon other islands than those at which the Blake touched by the kindness of enthusiastic colonists and others. The material available from Porto Rico consists of some received from Dr. A. Stahl, long a resident of Bayamon; some collected by Garman; and other specimens got by exchange from the United States national museum, collected by Stejneger and Richmond. From San Domingo as well as Guadeloupe there are specimens sent to Louis Agassiz by Duméril from the Paris museum. This material has a unique value, since it formed in many cases part of the material studied by Duméril and Bibron for their great Erpétologie général. More recently there has been received material collected by Mr. A. H. Verrill at Santiago de la Vega. From Haiti the Museum contains the large collection of Weinland, made at Jeremie and other points in the western district of the island; and from this collection Cope described many of the species peculiar to the island, although some were described by Garman at a later date. The most recent Haitian material comes as a part of the results of Mr. W. M. Mann's trip to the island from November, 1912 to February, 1913. From Cuba there is material contributed by Filipe Poey, Samuel H. Scudder, Wirt Robinson, and others. I have added to the collections the material collected during trips to the Bahamas, Cuba, and Jamaica. One of the special incentives to writing this paper was afforded by a large and finely preserved collection received from Grenada.

During a part of the summer of 1910 (August 17 to September 25) Messrs. G. M. Allen and C. T. Brues worked at Grenada in the interest of the Museum of Comparative Zoölogy. In view of the fact that in several branches the Museum already possessed adequate collections from this island, special efforts were made to collect only the most interesting and little-known elements in the fauna. Thus Dr. Allen discovered the armadillo, long known by hearsay only, which has proved to belong to a new race. He found besides several bats, either new species, or others of special interest. No attempt was made to do any marine collecting. Only few birds were wanted; and concerning these a short paper has been published (Barbour, Proc. Biol. soc. Wash., 1911, 24, p. 57-60). Mr. Brues devoted himself particularly to the insects; and, as a result, some fine material was procured. Prof. W. M. Wheeler has already written upon the ants (Bull. M. C. Z., 1911, 54, p. 167–172). Of more importance from a zoögeographical point of view was the finding, by both Allen and Brues, of specimens of a new species of Peripatus (Brues, Bull. M. C. Z., 1911, 54, p. 303-318). No Peripatus had previously been known from Grenada; and its close affinity with species in Trinidad and Guiana, together with the distinctness due to its isolated island life, make it important evidence, first, that it was not brought to Grenada by human agency, or otherwise fortuitously; secondly, that Grenada has never been completely submerged since its first separation from South America on the one hand and Antillea on the other. The species is extremely rare, and its distribution is very closely confined to a small highland area of virgin forest in the middle of the island. It does not, so far as their careful collecting goes to prove, ever occur in the low, cultivated lands, or in the Botanic gardens.

Dr. Allen and Mr. Brues made important archaeological collections, so that the trip was a most successful one.

It has already been mentioned that during the cruises of the Blake Mr. Alexander Agassiz was accompanied by Mr. Samuel Garman. After their return to Cambridge, Garman published his well-known series of papers dealing with the reptiles and amphibians of the various islands. Considering the fact that the time on shore was always limited to the short stay while the ship was in port, the collections are a monument to Mr. Garman's prodigious industry. But more important than the gathering of the material was the advance in method he made in studying it. He was the first to recognize that the various species existing in the Antilles did not occur scattered in a perfectly reasonless way upon various islands; but rather that each island possessed a fauna with certain well-marked features, and usually as well with well-marked local species

or races related to, but differentiated by isolation from, the forms found on the neighboring islands. At first, certain of the so-called conservative zoölogists objected at the making of such a large number of new species. Time, however, has justified Garman's work to a large extent.

Since the original writing of this paper Mrs. Barbour and I again visited Cuba (January–March, 1910) for the purpose of filling as many gaps as possible in the collection by collecting at localities in the island from which there was previously no material in the Museum. Cuban material is peculiarly important in this connection because of the close relationship of many Bahaman and Haitian species with those on Cuba. There has been question as to the identity or distinctness of these, and there are also many interesting and important points regarding the relative abundance and local distribution of species within the island. I left for Havana January 30th, and went directly to Soledad estate, near Cienfuegos, where I received the kind hospitality of Mr. Edwin F. Atkins and his family; and much aid, especially from Mr. R. M. Grey, who is in charge of the Harvard Botanical Station, and Captain Beal, of Colonia Guabairo who was more than kind to Mrs. Barbour and myself. From Soledad we returned to Havana, and were joined by Dr. and Mrs. J. L. Bremer. To Dr. Bremer I owe many thanks for his aid to my collecting. Together we visited Herradura, San Diego de los Baños, and the city and vicinity of Pinar del Rio, then later Madruga. We returned to Cambridge on March 15th. The notes on these specimens have been incorporated into the paper which was previously written. In connection with this Cuban trip, it is a great pleasure to thank my-old friend, Dr. Aristides Mestre, Assistant Professor in the University of Havana, and Dr. Carlos de la Torre, Professor in the University of Havana, for much kind advice and other aid, as well as for some very valuable books and specimens.

A delay in the publication of the paper enables me to include the results of my stay in Cuba during January–March, 1913. Prof. W. M. Wheeler and Mr. Louis A. Shaw were with me for the first two weeks and during the entire excursion I had the very great advantage and pleasure of the company of Dr. de la Torre and of his assistant Mr. V. J. Rodriguez. Upon this trip we devoted some attention to birds and mammals with uniform good fortune since many of the rarest and most interesting species were secured. Our first trip from Havana was to Bolondron where we were hospitably entertained by Mr. Edwin F. Sanborn at the Ingenio Armonia, from here we reached the edge of the Cienaga de Zapata at Hato Jicarito. From Bolondron we went to Aguada de Pasajeros which we made

a base for several excursions into the neighborhood, spending several days at the edge of the great Cienaga in a house kindly placed at our use by Sr. Francisco Morales. Sr. Morales's cane fields at Colonia San Francisco are on the Rio Hanabana and the enormous saw-grass morasses may be conveniently reached by horse-back. Travel in the swamp is quite a different matter to reaching the edge, however, although it is remarkable to see through how deep mud the horses will carry one before they must be left. The uneven hard substratum upon which the mud, covered with floating vegetation, rests almost in a liquid state makes riding quite exciting and it is not uncommon for one's horse to flounder into a depression almost disappearing in the ooze to be gotten out with some difficulty.

Crocodilus rhombifer the true Cuban crocodile was abundant about the Laguna de Punta Gorda which was perhaps our most productive collecting ground.

By the courtesy of Sr. Freyre and Sr. don Miguel Diaz the railways and other means of transport on the great estates of Maria Victoria and Perseverancia were at our disposal and our hearty thanks are due them for much courtesy and aid.

We returned to Havana from Aguada and Messrs. Wheeler and Shaw left for the North while Mr. Rodriguez and myself made a short excursion to Matanzas, Union de Reyes and Alacranes (Alfonso XII). Our object was to secure blind fishes and Crustacea from the caves of the southern part of Matanzas province and in this we were successful.

Returning again to Havana Professor de la Torre joined us and we started at once for Bayamo. From here we proceeded to Baire by rail and then by horse-back to the village of Los Negros where we stayed some time and to Pozo Prieto. Near the latter locality we spent several days at the cafetal El Alto of Sr. Pedro Diaz which was a fine locality in the heart of the humid forest region of the Sierra Maestra. Returning to Bayamo our party divided, Señor Rodriguez going to Bueycito and the region of the Pan de Azucar while Professor de la Torre and myself went to Manzanillo and by various stages south to Cabo Cruz. Here the successful search was made for Cricosaura and Tarentola. After this trip we went back to Manzanillo, to San Luis and then to Guantanamo. Here we stayed with Mr. C. T. Ramsden whose study of Cuban birds is well known. A return to Bayamo and Havana with a few short days there together with Mrs. Barbour, who came down to meet me ended a most charming and profitable trip. Our collection was small but the common

species were already well represented and only such species as were especially desirable were searched for.

The revival of interest in zoögeography has prompted making this paper more than a simple check list, although such a list of the reptiles and amphibians of the Antilles has long been needed. The species which are included in this list are only those which seem to be worthy of recognition; all other recorded species are considered synonyms or incorrect records for the area. This comprises the Bahamas, Greater and Lesser Antilles as far south as Grenada; Swan Islands and the Cayman group are also included. As stated elsewhere among the notes on certain species, the practice has been followed of recognizing island races as far as possible. It is considered that a more incorrect concept is gained regarding the conditions among these islands by stating that the same species occurs upon several islands, when there is generally a constant definitive variation seen in individuals from each island, even though in some cases this variation appears to be slight. Jordan's law of evolution by isolation has often been startlingly effective in producing very distinct species upon nearly adjacent islands, where these islands have apparently — indeed, one might say certainly exactly the same physical and climatic conditions.

No attempt is made to give complete synonymies; and unless some special comment is made, those species which have been considered synonyms by Boulenger in his catalogues are so accepted.

This paper must be considered in the nature of a preliminary, since unfortunately press of time and in many cases want of material have prevented the writing of a herpetology, with descriptions and keys for the identification of species. This list will show where reptile collecting in the West Indies can be carried on most profitably, what material from the region is available for study in the Museum of Comparative Zoölogy; and these records, which have been carefully culled, serve as a basis for certain considerations regarding the geographical distribution of Antillean reptiles and amphibians, and regarding the origin of this fauna.

Note.—After this paper was about completed, Mr. George Nelson of the Museum staff made three visits to the Swan Islands thanks to the kindness of Dr. W. A. Brooks. Together several months were spent there, and collections made in winter, spring, and summer. For the first time the islands have been studied by the same person at various times of the year. Mr. Nelson's material force the reconsideration of conclusions which maintain that the Swan Islands had an oceanic origin. Special mention may be made of the very strange fact

that Mr. Nelson's collections prove definitely that *Tiaporus fulginosus* Cope, a teid genus supposedly peculiar to the islands does not occur there. The types were collected by Townsend in 1887 and there is documentary evidence in his correspondence with the U. S. national museum which leaves no doubt as to the fact that the type specimens were actually taken on Swan Island. If the species was confined to the larger island, it, being wholly terrestrial in habit, may have been exterminated by the introduced cats.

In 1911 Mr. Percy R. Lowe published a quite fascinating book, A Naturalist on Desert Islands, though why "desert islands" does not at once occur to one. Lowe spent three weeks about the Swan Islands on the yacht Zenaida landing frequently and making considerable collections. He is firmly convinced that they have never been in connection with any of the land masses which have in the past existed in the Caribbean region. The geologic evidence which he brings forward certainly supports his contention but, so far no borings have been possible to show the real underlying structure of the islands. The fauna is rich, equally so upon Little Swan, which has never been inhabited and cultivated, as upon the greater island, which has.

Remarking upon the indigenous species of hutia Lowe (p. 103) speaks of:—

"A strange race of vegetarian rats (Capromys), tree-dwellers or tree-climbers, and now almost extinct on other islands in the West Indies, but which found their way across the sea to Swan Island in the same fashion as the iguana, and there founded a specific race of their own."

#### Again on p. 112–114 we read:—

"This rat is of an extremely mild and almost genial disposition; has a head and body very much after the style of an enormous guinea-pig; and is covered with rather long and silky hairs protruding through a thick fur. Its specific name is Capromys thoracatus of True, and the species thoracatus is restricted to Swan Island. The genus Capromys to which it belongs is an interesting one; for it comprises arboreal forms which are only found in the larger West Indian Islands such as Cuba and Jamaica, where it is in imminent danger of becoming extinct. It is just possible, therefore, that Little Swan Island will, in the future, represent the last stronghold of this peculiar and old time race of rats, for here they are left absolutely unmolested; and no enemies, human or otherwise, seem likely to disturb them. Scientifically, these rats are allied to the coypu (Myopotamus) of South America; an animal attaining to the length of two feet, which lives in burrows near the water, and feeds on aquatic plants. How these rats came to find their way to Swan Island is a little point in the problem of the distribution of species which may be worth referring to; for as we have seen, there is every reason to suppose that Swan Island has never had any connection with the mainland, and is of infinitely later date, geologically speaking, than the islands comprising the Greater Antilles, being of quite recent coral origin. Indeed as far as its fauna is concerned, Swan Island might be looked upon as an oceanic or pseudo-oceanic island.<sup>1</sup> If, as seems most likely, this Swan Island race

<sup>&</sup>lt;sup>1</sup> There are no snakes on Swan Island.

of rats was derived from the race which inhabits Jamaica (C. melanurus) the original progenitors of the Swan Island species must have drifted over a sea space of at least three hundred and twenty miles; for Swan Island lies exactly that distance in an almost due westerly direction from the nearest point of Jamaica, along the course of the Gulf Stream. The genus is not found on the mainland of Honduras, ninety-eight miles to the south, which puts this comparatively short sea-route out of court.

For the sake of those who may not have given such a subject a thought, we might add that a journey of this nature across an open sea could only have been rendered possible by the rats having been carried out to sea by means of a floating island of vegetation, or a mass of entangled tree-trunks such as one often sees in mangrove swamps."

This entire account is so inaccurate that one's confidence in the author's interpretations and observations in geology are sadly shaken. This creature which is in no wise related to the rats except that it is a rodent, is not like C. melanurus which also, is not found on Jamaica. C. browni is the Jamaican form, a wholly distinct species now rare owing to mongoose ravages. C. melanurus is a long-tailed species from the high mountains of eastern Cuba. In Cuba two other species, C. pilorides and C. prehensilis, are abundant, the former extremely so. The genus is not, except for the Swan Island species, confined to the Greater Antilles, but a species, C. ingrahami, is found in the grass of one of the small lowlying Plana Keys of the southern Bahamas. It is mathematically improbable that an island of vegetation set affoat from a country like Jamaica where there are no rivers capable of performing this relatively rare phenomenon would be inhabited at the same time by a hutia. The island would also have to steer very carefully to meet Swan Island which is very small, and even granting that there was a current to carry it along or a suitable wind which would drive it two and one half miles an hour, without submerging it, one hundred and twenty-one hours approximately would be necessary for the voyage. Unless more than one hutia was carried on the island, this voyage would have to be performed by a second hutia which would have to reach the island before the death of the first. It is of course, improbable that these events have ever happened. The habits of the Jamaican Capromys are not such as to render it likely that it would ever have attempted so precarious a sea trip and there are no physical conditions in Jamaica which would have forced it to do so. Contrary to Lowe's assertion there are snakes upon the Islands, one of which represents an autocthonous race. Of course the absence of fresh water and other adverse physical features strictly limit the variety of living forms which the islands can support. Pulmonate gastropods <sup>1</sup> occur and a variety of insects — so that the fauna is not surprisingly poor but

<sup>&</sup>lt;sup>1</sup> For a notice of the affinities of the extremely interesting species of land shells peculiar to Swan Island, see Clapp, Nautilus, Jan. 1914, 27, No. 9, p. 97–101.

rather the reverse. It will be surprising indeed if there is not geological evidence, however difficult it may be to find, which will prove that the Swan Islands are the remnants of an ancient land mass which once reached to Jamaica and perhaps, or even probably, also that commissure which once reached from the mainland to the east end of Cuba, via the Cayman Islands when the east end of Cuba was an island separate from the rest of what is now Cuba. Oceanic deeps are certainly not all of ancient origin; and there are many restricted areas of Cuba, Jamaica, or Florida which if, by some oscillatory or submerging process, they were left above the sea level and their surrounding areas had vanished would be as difficult as Swan Island is to prove their earlier connection with other land, near at hand or far away.

Günther's remarks, which I have quoted at length, apply far better to his own attitude than to that of Garman; he has not shown at all that the range of variation for *M. dominica*, which he had increased, touches the range for that of *M. agilis*; while the average condition seen in the two categories of individuals show how distinct they are. Invidious remarks regarding the sense of specific discrimination are always dangerous.

The types are M. C. Z., No. 6,049.

#### Mabuya luciae GARMAN.

Garman, Bull. Essex inst., 1887, 19, p. 51. Boulenger, Proc. Zool. soc. London, 1891, p. 353.

While considering this species as a variety of *M. agilis*, Boulenger admits its subspecific rank. For the sake of consistency it is here considered a full species; there being, however, obviously no question as to its origin from this mainland species. It occurs upon St. Lucia. The types are M. C. Z., No. 6,046.

#### Mabuya aenea GRAY.

Gray, Griffiths Cuvier's Animal kingdom, 1831, 9, Syn. reptil., p. 70. Garman, Bull. Essex inst., 1887, 19, p. 53.

Garman considers specimens from St. Vincent, Grenada, and Trinidad distinct from *M. aurata* Schneider, from southern Central America to Brazil. Boulenger (Proc. Zool. soc. London, 1891, p. 355) considers the Antillean specimens referable to the latter species. If, when it becomes possible to study large series, the characters which Garman points out are found to be constant, then each of the two groups of individuals will be obviously entitled to hold specific rank.

#### Typhlops lumbricalis Linné.

Linné, Syst. nat. ed. 10, 1758, 1, p. 228. Stejneger, Rept. U. S. nat. mus. for 1902, 1904, p. 684.

This species extends from the region of the Guianas to both the Lesser and Greater Antilles. It has long been known from many islands, among them Dominica, St. Kitts, Antigua, the Virgin Islands, Guadeloupe, Martinique, Mona, Porto Rico, Haiti, Jamaica, Cuba, and some of the Bahamas. In the latter group it was first recorded by Cope (Proc. U. S. nat. mus., 1887, 10, p. 439) from Great Abaco. In 1904 I found it again on the same island (Bull. M. C. Z., 1904, 46, p. 59). Curiously enough it was not found on either New Providence or Andros Island until Rosén collected specimens at both localities (Rosén, Lunds univ. arsskrift, 1911, 7, no. 5, p. 37). In Cuba and Jamaica its distribution is very wide, and I have found it at practically every station visited.

REPTILIA. 323

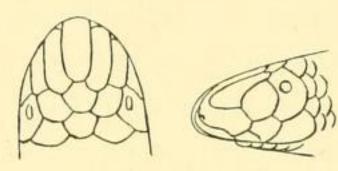
#### Typhlops pusillus, sp. nov.

Type: — No. 8,719, M. C. Z., Cape Haitien, Haiti, W. M. Mann, collector. Four paratypes, two from Grand Riviere, one from Cape Haitien and one from Ennery, Haiti.

Similar to *T. lumbricalis* in color and number of rows of scales, which are twenty in number, but widely different from this and the other West Indian species in details of cephalic squamation.

Snout depressed and somewhat projecting; nostrils below lateral horizontal

edge; rostral a little less than two sevenths the width of the head, not extending backward to the line of the eyes; details of head shields as shown in drawings. Scales in twenty rows; about 370 scales on midventral line from chin to vent, and nineteen under tail, which ends in a spine. Color



Top and side view of head of type enlarged six times.

brown; edges of scales darker than their centres; ventral surfaces cream color. Size of type, about five inches.

#### Typhlops tenuis Salvin.

Salvin, Proc. Zool. soc. London, 1860, p. 454. Boulenger, Cat. snakes Brit. mus., 1893, 1, p. 28. Rosén, Lunds univ. arsskrift, 1911, 7, no. 5, p. 37.

Rosén found a single specimen which he identified with this species at Mastic Point, Andros Island. It had, however, twenty-two rows of scales about the body instead of eighteen; and as this character is not variable among many Typhlopidae, *T. tenuis* among them, there is ground for reasonable doubt as to the correct identification of the species. Rosén does not mention that he had other specimens for comparison. The species is one which ranges through southern Mexico and Guatemala.

#### Typhlops rostellatus Stejneger.

STEJNEGER, Rept. U. S. nat. mus. for 1902, 1904, p. 686, figs. 146-147.

A species peculiar to Porto Rico, which upon that island takes the place of its close relation, *T. platycephalus* Duméril & Bibron from Martinique, and *T. dominicana* Stejneger from Dominica. There yet remain many islands from which representatives of this group of species have not yet been described, but upon which they undoubtedly exist.

#### . Typhlops platycephalus Duméril et Bibron.

Duméril et Bibron, Erpét. gén., 1844, 6, p. 293.

A species sent from Martinique by Plée to the Paris museum. It is confined to the island, and is very rare in collections; of its abundance on the island nothing is known.

#### Typhlops dominicana Stejneger.

Stejneger, Rept. U. S. nat. mus. for 1902, 1904, p. 687.

Stejneger has shown that Boulenger's description (Cat. snakes Brit. mus., 1893, 1, p. 30) of *T. platycephalus* Duméril & Bibron, based on specimens from Dominica, differs in important characters from the original description based on specimens from Martinique. He then proposes for the species apparently confined to Dominica, of which in 1893 there were four specimens in the British museum, the name *Typhlops dominicana*.

#### Leptotyphlops albifrons (WAGLER).

Wagler, Spix's Serp. Braz., 1824, p. 68, pl. 25, fig. 3. Boulenger, Cat. snakes Brit. mus., 1893, 1, p. 63.

This very widely distributed species, besides being recorded as distributed on the Tropical American mainland, has been recorded in the Antilles from Watlings Island, Grenada, and Antigua. It doubtless ranges widely through the Lesser Antillean chain. Recently Mr. Nelson has brought back a series of eight specimens from Swan Islands. He reports it common there and found in the leaf mould of the forest, it is often seen in broad day light crawling about in paths and clearings.

#### Leptotyphlops bilineata (Schlegel).

Schlegel, Abbild. Amphib., 1844, p. 36, pl. 32, fig. 5-6. Boulenger, Cat. snakes Brit. mus., 1893, 1, p. 70.

Recorded originally by Duméril and Bibron (Erpét. gén., 1844, 6, pp. 331) from Martinique and Guadeloupe. There was also a specimen from Barbados in the British museum. The snake is apparently rare, and is seldom found by collectors.

#### Epicrates subflavus Stejneger.

Stejneger, Proc. U. S. nat. mus., 1901, 23, p. 469-470.

The Jamaican yellow boa was only separated in 1901, after very many years of confusion with the Porto Rican species, *E. inornatus*. It has been almost exterminated by the ravages of the mongoose (*Herpestes birmanicus*