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EXPEDITION OF THE CALIFORNIA ACADEMY
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ISLANDS, 1905-1906

IV
THE SNAKES OF THE GALAPAGOS ISLANDS

BY JOHN VAN DENBURGH
Curator of the Department of Herpetology

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INTRODUCTION

In reporting upon the snakes secured by the Academy through its expedition of 1905 and 1906, I wish first of all to express my appreciation of the energy and care of my assistant, Mr. Joseph R. Slevin, upon whom, as chief herpetologist of the expedition, rested the responsibility of gathering and preserving the collection which has made this paper possible. I am indebted to him also for the counting of many scales. To Mr. E. S. King, and to other members of the expedition who aided in the collection of reptiles, my thanks are due. Professor Charles H. Gilbert, as so often in the past, has aided me by kindly permitting me to make use of specimens in the collection of Stanford University. From Dr. George A. Boulenger I have received, regarding certain specimens in the British Museum, information which has been most useful.

All measurements are given in millimeters. The numbers by which specimens are designated are the serial numbers of the reptile collection of the Academy, except such as are preceded by the letter S. These latter are the numbers attached to specimens in the collection of Stanford University, and refer to the register of its reptile collection.

The sea snake *Hydrus platurus* is here first recorded from the Galapagos. The following snakes are described as new:

Dromicus hoodensis

Dromicus slevini

Dromicus steindachneri

Dromicus occidentalis

Dromicus occidentalis helleri

PREVIOUS COLLECTIONS AND STUDIES

It is probable that the presence of snakes in the Galapagos Archipelago was first recorded by Dampier, who, in his *Voyages*, mentions green serpents seen there in 1684. Delano, Porter, and Darwin refer to them briefly in their *Narrative* and *Journals*.

Darwin, I believe, was the first to carry back to Europe a specimen of this snake. It was caught on Charles Island, and

Bibron considered it identical with a Chilian species. It was so regarded until 1860, when Günther, in the *Proceedings of the Zoological Society of London*, pointed out certain differences between the mainland and the Galapagos snakes, and named this Charles Island specimen *Herpetodryas biserialis*.

In 1869, Peters recorded a specimen in the Museum of Stockholm, collected in the Galapagos by Dr. Kinberg, as identical with the mainland *Dromicus chamissonis*. Günther in the *Zoological Record* for 1869, remarks that he "can confirm Professor Peters's observations, having now seen a series of examples of this snake from these islands. There were two varieties, one very similar to the common continental form, the other identical with the snake described by him from a young specimen under the name of *Herpetodryas biserialis*. Some examples were intermediate between the varieties, so that there is no doubt about their specific identity. The syncranterian character of the dentition is not well developed in this species."

The Hassler expedition secured no snakes in the Galapagos Islands, but one was seen upon Jervis Island, in June, 1872.

Still later, Dr. Steindachner secured for the Vienna Museum five snakes which Dr. Habel had collected in the Galapagos Archipelago in 1868, and which, he says, are the specimens to which Dr. Günther referred in his note in the *Zoological Record* for 1869. These specimens showed two types of coloration—spotted and striped—and Dr. Steindachner regarded them as two varieties of the continental *Dromicus chamissonis*. The spotted form he called *Dromicus chamissonis* var. *dorsalis*, while the striped specimens were named *Dromicus chamissonis* var. *habelii*. These snakes were said to have been found on Indefatigable, Hood, Charles and Jervis islands; but the gastrostege counts given by Dr. Steindachner, and his description of the post oculars and temporals, differ from the conditions found in the snakes of Charles and Hood islands to an extent which enables us to say that his specimens must have come from Indefatigable or Jervis.

No other names have been proposed for Galapagos snakes. As the years have passed, and snakes have been found on Charles, Hood, James, Jervis, Barrington, Indefatigable, Albe-marle, and Narborough islands, authors have sometimes

regarded them as identical with the mainland *Dromicus chamissonis*, sometimes as one or two distinct varieties (spotted and striped) of this mainland species, sometimes as a distinct species, *D. biserialis*, with or without a subspecies, *D. biserialis habelii*. As Garman put it, "there is nothing in the published evidence to show that the striped form, the spotted form, that with two postorbitals, and that with three do not occur amongst the individuals of any of the localities inhabited by this snake. Günther's type has three postorbitals and is spotted, Dr. Baur's specimen has three postorbitals and is striped, and Steindachner's varieties, both striped and spotted, have but two postorbitals."

Even as regards the generic term to be applied to these snakes, there has not been agreement among herpetologists. Günther at first placed them in the genus *Herpetodryas*, but later followed Peters in referring them to the genus *Dromicus* of Bibron. Here they have been placed also by Steindachner and Boulenger. Cope, in 1889, applied to them the generic name *Opheomorphus* Fitzinger, but Garman has shown that this is a synonym of *Liophis* Wagler, being founded on the same type. Garman reverted to Fitzinger's *Orophis* of 1843—the type of which he states is *Coronella chamissonis* Wiegman—because he held that the species of the Galapagos Archipelago of Chile, and of Peru differed generically from the West Indian species, which he retained in Bibron's genus *Dromicus*. Still later, Cope divided all these snakes into three genera: *Dromicus* Bibron, with no scale-pits; *Monobothris* Cope, with one scale-pit; and *Alsophis* Fitzinger, with two scale-pits. *Monobothris* Cope has as type *Dromicus chamissonis*, and is therefore a synonym of Fitzinger's *Orophis* which was based upon the same species. Stejneger has called attention to the fact that Bibron's *Dromicus*, 1842, is preoccupied by *Dromica* Dejean, 1826, and has revived Fitzinger's *Leimadophis* for the species which normally have no scale-pits; but the recent ruling of the Committee on Nomenclature of the International Congress sanctions the use of the name *Dromicus*. *Leimadophis* therefore must revert to the synonymy.

We thus have left three generic names—*Dromicus* Bibron, 1842, based upon a West Indian species without scale-pits; *Orophis* Fitzinger, 1843, established upon the Chilean species

with one scale-pit; and *Alsophis* Fitzinger, 1843, the type of which is a West Indian snake with two scale-pits. The only character which has been held to distinguish these genera is the number of scale-pits. However, since the snakes of the Galapagos Archipelago are certainly congeneric, and since it will be shown that they have scales with two or one or no pits, there seems to be no good reason for recognizing more than one genus for all these snakes—West Indian, Chilian and Galapagos—which agree in every other respect. Any other course would mean the establishment of genera which were in no sense natural groups; for the Hood Island snakes are certainly more closely related to the other Galapagos serpents than they are to the West Indian species which have no scale-pits. It would seem that as differentiation has proceeded, certain of the species in the Galapagos have lost their scale-pits, as others have in the West Indies.

THE GENUS *Dromicus* BIBRON

1842, *Dromicus* (not *Dromica* Dejean, 1826) BIBRON, in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., 1842, p. 133 (type *Coluber cursor*); BOULENGER, Cat. Snakes Brit. Mus., II, 1894, p. 118.

1843, *Alsophis*, FITZINGER, Syst. Rept., 1843, p. 26 (type *Psammophis antillensis* Schlegel); STEJNEGER, Report U. S. Nat. Mus. for 1902, 1904, p. 699.

1843, *Leimadophis*, FITZINGER, Syst. Rept., 1843, p. 26 (type *Coronella almadensis*=*D. reginæ*); STEJNEGER, Report U. S. Nat. Mus. for 1902, 1904, p. 694.

1843, *Orophis*, FITZINGER, Syst. Rept., 1843, p. 26 (type *Coronella chamissonis* Wiegman). GARMAN, Bull. Essex Inst., XXIV, 1892, p. 86.

1843, *Calophis*, FITZINGER, Syst. Rept., 1843, p. 26 (type *Herpetodryas cursor*).

1854, *Tæniophis*, GIRARD, Proc. Acad. Nat. Sci. Phila., 1854, p. 226 (type *T. tantillus*=*D. chamissonis*).

1862, *Haliophis* COPE, Proc. Acad. Sci. Phila., 1862, p. 77 (emend.).

1882, *Alophis*, STAHL, Fauna Puerto-Rico, 1882, p. 70 (err.).

1884, *Ocyophis*, COPE, Proc. Amer. Philos. Soc., XXIII, 1884, p. 491 (type *O. ater*).

1887, *Halsophis*, COPE, Proc. U. S. Nat. Mus., X, 1887, p. 439 (emend.); COPE, Trans. Am. Philos. Soc., XVIII, 1895, p. 201.

1894, *Liophis* (not of Wagler, 1830), BOULENGER, Cat. Snakes Brit. Mus., II, 1894, p. 126 (part).

1894, *Monobothris*, COPE, Amer. Nat., 1894, p. 841 (type *Dromicus chamissonis*); COPE, Trans. Am. Philos. Soc., XVIII, 1895, p. 201.

All of the land snakes of the Galapagos Archipelago agree in their dental and hemipenial characters. The maxillary teeth vary from ten to twelve in number, followed, after an

interspace, by two larger ones. Thus, counting all sockets as well as teeth:—

No. 11935, *Dromicus hoodensis*, from Hood Island, has 12 and 2.

No. 11800, *Dromicus hoodensis*, from Hood Island, has 12 and 2.

No. 11926, *Dromicus hoodensis*, from Hood Island, has 12 and 2.

No. 11930, *Dromicus hoodensis* from Hood Island, has 10 and 2.

No. 10782, *Dromicus dorsalis*, from James Island, has 11 and 2.

No. 10483, *Dromicus dorsalis*, from South Seymour Island, has 10 and 2.

No. 11488, *Dromicus occidentalis*, from Narborough Island, has 11 and 2.

No. 10281, *Dromicus occidentalis helleri*, from Brattle Island, has 10 and 2.

No. 10617, *Dromicus steindachneri*, from Jervis Island, has 11 and 2.

The hemipenes of *Dromicus hoodensis* (No. 9336) from Hood Island, of *Dromicus slevini* (No. 12216) from Duncan Island, and of *Dromicus dorsalis* (No. 10483) from South Seymour Island, all are divided, with furcate sulcus, calyculate, spinous proximally, and with no apical disc. They agree in every respect with the figures given by Cope of these organs taken from "*Monobothris*" *chamissonis*, "*Alsophis*" *angulifer* and *Dromicus parvifrons* of Peru, Cuba and Hayti.

Scale-pits do not occur in all the scales of any specimen from the Galapagos. When they are present, they are most constant in the scales in or near the region of the lateral stripe and on the upper surface of the tail. Most careful examination has failed to disclose any trace of pits in any scale of any of the Galapagos snakes having fewer than one hundred and ninety gastrosteges. The Hood Island and the Charles Island species also normally have no scale-pits; but long search on the thirty-six specimens at hand from Hood resulted in the discovery of a single scale with one pit. Excepting the species from these two islands, all of the snakes of the Galapagos with

more than two hundred gastrosteges bear scales with two pits. They also have scales with no pits, and usually others with one pit. In some cases large scales on the tail have three or four pits. While these pits, therefore, are not of generic value, they are of great use in the separation of species, as shown in the following:

KEY TO GALAPAGOS SPECIES OF DROMICUS

- a.—No scale-pits.
 - b.—Gastrosteges more than 195 (203-214).
 - c.—General coloration in spots; scales in 19 rows. Charles and Gardner-near-Charles.
Dromicus biserialis.—p. 336.
 - c.²—Striped, the stripes fading out posteriorly; scales in 17 or 19 rows. Hood and Gardner-near-Hood.
Dromicus hoodensis.—p. 338.
 - b.²—Gastrosteges fewer than 195 (169-183).
 - cc.—Postoculars two; no longitudinal light stripes. Duncan, Albemarle, Narborough.
Dromicus slevini.—p. 351.
 - cc.²—Postoculars normally three (rarely two); longitudinal light stripes present. Jarvis, South Seymour, Indefatigable.
Dromicus steindachneri.—p. 353.
- a.²—Scale-pits present.
 - bb.—Gastrosteges more than 210 (213-252).
 - ccc.—Gastrosteges usually not more than 232 (213-236). James, Jarvis, Barrington, Indefatigable, South Seymour.
Dromicus dorsalis.—p. 341.
 - ccc.²—Gastrosteges not fewer than 236 (236 to 252); prominent light markings on nape spots or transverse blotches.
 - d.—Usually striped; light nuchal blotches and a series of dark spots on tips of gastrosteges and on lower lateral scales very distinct. Narborough.
Dromicus occidentalis.—p. 347.
 - d.²—Spotted, without longitudinal light stripes; no series of definite rounded blackish spots on lateral scales of first and second rows; light nuchal markings less prominent. Albemarle and Brattle.
Dromicus occidentalis helleri.—p. 349.
 - bb.²—Gastrosteges fewer than 210 (178-201). Chile and Peru.¹
Dromicus chamissonis.

THE MATERIAL FOR THIS STUDY

It will be seen that I have recognized seven kinds of land snakes from the Galapagos Archipelago. This has been made

¹ There can be little doubt that more than one species occurs in Chile and Peru. The wide range in the number of gastrosteges would indicate this, and Dr. Boulenger, who most kindly has examined the scale-pits in the specimens in the British Museum in response to my request, writes me that most of the Chilean and Peruvian specimens have scales with single pits, while those from Chiloe have scales with two pits. These specimens from Chiloe doubtless represent a distinct species, as yet unnamed.

possible only by the large number of specimens secured. The collection included ninety-eight snakes from these islands, and I have also had the privilege of examining eight in the Stanford University collection, making, in all, one hundred and six specimens, distributed as follows:

| | |
|------------------------------------|----|
| Hood | 36 |
| Indefatigable | 24 |
| Barrington | 15 |
| James | 8 |
| Narborough | 7 |
| South Seymour | 5 |
| Jervis | 4 |
| Brattle | 2 |
| Gardner-near-Hood | 1 |
| Gardner-near-Charles | 1 |
| Duncan | 1 |
| Cowley Mt., Albemarle | 1 |
| Cape Berkeley, Albemarle | 1 |

Although this material seems large, it is quite inadequate for the final settlement of many of the questions which present themselves. The series from Hood is the only one that really is satisfactory. The Indefatigable series might at first seem so, but one of the species found on that island is represented only by a single specimen; and the twenty-three examples of the other species are not enough to furnish a satisfactory explanation of the presence of both spotted and striped styles of coloration. The numbers secured on the other islands are, of course, still less satisfactory, especially when one recalls that we have two distinct species from several of the islands.

It is probable, too, that larger series from many of the islands would enable us to recognize specific or subspecific differences which are now hidden by individual variation. Thus, the snakes which I am forced to group together as *Dromicus slevini* may very well represent at least two different races. Similarly, the snakes of James and Jervis may be found to differ from those of Barrington and Indefatigable, as is pointed out under the head of *Dromicus dorsalis*, and those of Brattle possibly will be found to be not identical with those of northern Albemarle. The solution of these problems, how-

ever, must await the gathering of larger series from all the islands except Hood, and perhaps Charles.

No snakes ever have been taken on Culpepper, Wenman, Abingdon, Bindloe, Tower, or Chatham islands. One of the residents of Chatham told Mr. Slevin that snakes were not uncommon there, but careful search failed to bring one to light. They must now be quite rare on Charles; for no member of our expedition saw one on Charles Island itself, although one was secured on the close-lying islet known as Gardner-near-Charles.

ORIGIN OF THE GALAPAGOS SNAKES

The closest relatives of the serpents of the Galapagos Archipelago are a number of distinct species native to the Bahamas, Greater and Lesser Antilles, Costa Rica, and all of South America—species which Boulenger includes in the genera *Dromicus* and *Liophis*. Whether or not all of these species actually belong in the genus *Dromicus* cannot be positively stated until the hemipenial structure of each has been examined. The results of such an examination, however, cannot be expected to affect the truth of the statement that the Galapagos snakes have very close relatives throughout the West Indies and South America.

This being true, the snakes of these localities must have had a common origin. Either the West Indian and Galapagos snakes have been derived from South America, or else all must be descendants of species which, in a former geological period, occupied a great central land-mass which has sunk below the level of the sea, leaving mere remnants in Central America, northern South America, the Antilles, and the Galapagos. Much may be said in favor of each of these theories. I believe that the data are not yet at hand which will enable us to choose between them.

Either view implies a former land connection and a continental origin of the Galapagos ophidian fauna. I cannot bring myself to share the opinion of those who believe that the fauna of the Galapagos has reached these islands by the more or less accidental agency of the winds and ocean currents. The various species must have spread slowly over some conti-

mental mass with which the Galapagos were connected or of which they formed a part.

When the Galapagos finally became separated from the rest of the world, it is probable that most or all of the present islands remained for a time united. The northern islands must have been the first to establish an independent existence, and it is possible that their separation may have occurred before snakes reached the Galapagos, and, therefore, before the old continental bridge was broken; but I think it more probable that snakes once inhabited these islands also. Culpepper and Wenman islands are, of course, unfavorable for the continued existence of snakes. Just why they never have been found on Abingdon and Bindloe is indeed hard to understand.

While all of the snakes of the Galapagos Archipelago are closely related, they nevertheless are of two distinct types. These are the small snakes with no scale-pits and fewer than one hundred and ninety gastrosteges, and the group of species with more than two hundred gastrosteges.

These two groups I believe to be the descendants of two species which originally occupied the Galapagos. My chief reasons for this opinion are the absolute distinctness of the two groups, and the fact that representatives of both have been found upon the same islands.

The snakes with more than two hundred gastrosteges fall naturally into three subgroups. These are: first, the snakes of Charles and Hood; second, those of Narborough, Albemarle and Brattle; third, those of James, Jervis, Indefatigable and Barrington.

The first of these subgroups is the most distinct. Differentiation has progressed much farther on Charles and Hood islands than elsewhere in the archipelago. Therefore, we may believe that these southern islands were separated from the central ones before the latter were divided one from another.

The snakes from Charles and Hood islands are very closely allied. They agree in all essential characters except color. They alone of the larger Galapagos snakes lack the scale-pits, and both have the same number of gastrosteges. Differentiation could hardly have occurred along lines so absolutely parallel in two unconnected islands. We are therefore led

to believe that Charles and Hood islands were connected, and formed a single island for a long time after their separation from the more northern or central islands.

The snakes of the two Gardner islands agree in every detail with those of the larger islands to which these are adjacent, so that the separation of the one Gardner from Charles, and of the other Gardner from Hood, must have occurred still more recently.

The second and third subgroups are much more closely related to each other than to the first. This may be considered to indicate that all of the central islands from Narborough to Barrington and from James to Brattle—with the possible exception of Duncan—remained connected for a considerable period after the separation of the northern and the southern islands.

The distribution of the second and third subgroups, and of *D. slevini* and *D. steindachneri*, indicates that there occurred at a still later date the separation of this central land into two large islands; an eastern, including the present James, Jervis, Indefatigable and Barrington Islands; and a western, of which Narborough, Albemarle and Brattle formed parts.

The more recent changes are much less clearly indicated by the ophidian fauna, but certain color-differences render it probable that Narborough became separated from Albemarle before breaks in the eastern island occurred, first between Barrington and Indefatigable, then between James and Indefatigable, and lastly between James and Jervis.

The snakes of Albemarle are at present known only from two specimens—one *Dromicus slevini* from Cowley Mountain, and one *Dromicus occidentalis helleri* from Cape Berkeley. Under such conditions little can be deduced as to the past history of this island without the use of evidence furnished by other groups of its inhabitants. This evidence I do not now wish to use; for I believe more accurate results can be attained by attempting to read the story of each group separately, and then comparing results. The mixing of evidence here, it seems to me, would be only less confusing than the jumbling together of data derived from distribution, geology, paleontology, and ocean-soundings. Each should be worked

out separately before comparing results, in order that one may serve to confirm or disprove the other.

If we have read this story of the snakes correctly, there is nothing in the least suggestive of an unconnected group of volcanic islands thrust independently above the surface of the ocean, to become the home of such animals as might reach them through more or less accidental or occasional agencies of dispersal. Instead of telling of the elevation of new islands, the evidence points to the gradual depression and partial submersion of a more extensive land-mass which must have had direct or indirect connection with continental America.

When we consider the snakes from the various islands as regards the style of their coloration—whether spotted or striped—we find an interesting fact. On almost every island only one style of coloration is present. Thus, all the snakes of Hood, James, and Jervis are striped; while on Charles, Albemarle, and Brattle only spotted snakes have been found. But when we come to Narborough, Indefatigable and Barrington islands, we find that each island has both spotted and striped snakes. Why should a difference of coloration so constant on other islands be inconstant here?

We have seen that the snakes of Charles and of Hood are alike, except that those of Charles are spotted while those of Hood are striped. If these two islands should now become connected for a time, we might expect spotted snakes to wander to Hood, and striped ones to appear on Charles. If these islands again became separated, we should find both spotted and striped snakes on each island; but if the connection had been short, we might expect a majority of the snakes of Charles, and a minority of those of Hood, to show the spotted coloration.

Fifty-three per cent of the fifteen snakes from Barrington are spotted. Seventy-four per cent of the twenty-three specimens from Indefatigable are striped. More numerous specimens might change the proportion and show that the suggested explanation is quite wrong, or that differentiation is now for the first time developing between the Indefatigable and the Barrington snakes. The parallelism between the conditions actually found on Barrington and Indefatigable, and the conditions which we might expect to find upon Charles

SUGGESTIONS TO FUTURE STUDENTS

Future collectors in these islands should strive to secure specimens of the snake of Chatham Island, if such there be. Doubtless, it will prove to be a most interesting new species. Duncan Island is one of the most difficult to understand of all the islands of the archipelago. Its snakes are represented in collections only by a single specimen of *D. slevini*, although there can be little doubt that a larger species, probably with two scale-pits, remains to be found there. Other specimens of *D. slevini* have been seen on Duncan Island; and, since these agreed perfectly in coloration with the type, it is almost certain that additional specimens from Duncan, Albemarle, and Narborough will show that more than one species is here referred to *D. slevini*. Many more specimens of *D. steindachneri* also are needed. Much remains to be learned of the larger snakes of Albemarle, which now are known from only one or two specimens. Dr. Boulenger writes me that the British Museum has a specimen with 222 gastrosteges, which is said to have been collected at Tagus Cove. I am inclined to doubt the correctness of this label; but if no error has crept in, there must be more than one species with two scale-pits in this island. The question then arises: Is there in Albemarle a distinct race of snake on each of the five principal mountains, as there is of tortoise? The answer must be based on many specimens yet to be collected. The question of the necessity of further division of *Dromicus dorsalis* also remains for future collectors to solve.

DISCUSSION OF THE SPECIES

Dromicus biserialis (Günther) CHARLES ISLAND SNAKE

1860, *Herpetodryus biserialis* GÜNTHER, Proc. Zool. Soc. London, 1860, p. 97 (type locality **Charles Island**).

1869, *Dromicus chamissonis* GÜNTHER, Zool. Record, 1869, p. 115 (part); BOULENGER, Cat. Snakes Brit. Mus., II, 1894, p. 119 (part).

1876, *Herpetodryas dorsalis*, STEINDACHNER, Festschr. Zool.-bot. Ges. Wien., 1876, p. 304 (err).

1892, *Orophis biserialis* GARMAN, Bull. Essex Inst., XXIV, 1892, p. 85 (part).

1903, *Dromicus biserialis biserialis* HELLER, Proc. Washington Acad. Sci., V, 1903, p. 93 (part).

Diagnosis.—No scale-pits; scales in 19 rows; gastrosteges 209; urosteges 108 to 110, all paired; postoculars three; temporals usually 2+2; spotted.

Type.—British Museum. **Charles Island, Galapagos Archipelago.** Charles Darwin. 1835.

Distribution.—Charles and Gardner-near-Charles islands, Galapagos Archipelago.

Material.—Only two specimens of this species are in collections. These are: the type, a young specimen from Charles Island, preserved in the British Museum, and one female specimen from Gardner Island—No. 9448 of the Academy collection.

Description of No. 9448.—Head rather long, with flattened top and rounded snout. Rostral plate large, a little broader than high, hollowed below, and bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals much smaller than prefrontals. Frontal longer than parietal suture. Anterior and posterior nasals distinct. Loreal well developed, longer than high. One large preocular with a very small one below it on each side of head. Postoculars three. Temporals two followed by two or three. Eight superior and ten inferior labials, sixth upper and sixth or seventh lower largest, fourth or fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior a little longer, anterior touching five labials. Scales on body smooth, without pits, in nineteen rows. Anal plate divided. Gastrosteges two hundred and nine. Tail complete. Urosteges one hundred and eight, all paired.

The color above is a pale grayish olive. A dark streak runs back from the eye. The infralabials and the posterior superior labials are blotched with yellowish white. There is a yellowish-white blotch on each side of the nape. There are no traces of longitudinal bands on the body, but along the back is a series of irregular dark brown cross bars or alternating spots. A few indications of similar spots may be made out on the sides. The tail is unspotted except near its base. The lower surfaces are creamy white, plentifully dotted or clouded with dark gray. There are no very distinct blackish-brown lateral spots on the anterior gastrosteges.

Length to anus, 590 mm.

Length of tail, 220 mm.

Variation.—The type specimen from Charles Island has two hundred and nine gastrosteges, one hundred and ten uros-

teges, three postoculars, scales in nineteen rows, and the spotted style of coloration.

General Remarks.—Snakes must be very rare on Charles Island, for none were seen there by any member of our expedition, although careful search was made for them. It is probable that the ravages of the smaller kinds of mammals that have been introduced there—particularly rats and cats—have pushed them to the verge of extinction, as they have the *Tropidurus*. It is probable that a longer search would show that snakes are still to be found on Champion and Enderby as well as on Gardner, for *Tropiduri* still are fairly abundant on all these islets.

The Charles Island snake is most closely related to the Hood Island species. It differs from that species in having numerous dorsal spots, no dorsolateral bands, and no definite dark spots on the anterior gastrosteges.

***Dromicus hoodensis* new species. HOOD ISLAND SNAKE**

1892, *Orophis biserialis* GARMAN, Bull. Essex Inst., XXIV, 1892, p. 85 (part).

1903, *Dromicus biserialis habeli* HELLER, Proc. Washington Acad. Sci., V, 1903, p. 93.

Diagnosis.—No scale-pits; scales in 17 or 19 rows; gastrosteges 203 to 214; urosteges 91 to 114, usually all paired; postoculars three; temporals usually 2+2; never spotted; striped, the stripes becoming obsolete posteriorly.

Type.—Male. California Academy of Sciences No. 11799. Hood Island, Galapagos Archipelago. J. R. Slevin. June 23, 1906.

Distribution.—Hood and Gardner-near-Hood islands, Galapagos Archipelago.

Material.—One specimen collected by Dr. Baur on Hood Island has been recorded by Garman. Two secured on Hood by Heller are Nos. 4970 and 4971 in the collection of Stanford University. The Academy has thirty-four from Hood and one from Gardner-near-Hood.

Description of the type.—Head rather long, with flattened top and rounded snout. Rostral plate large, a little broader than high, hollowed below, and bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals much smaller than prefrontals. Frontal slightly longer than parietal suture. Anterior and posterior nasals distinct. Loreal well developed, longer than high. One preocular. Postoculars three. Temporals two followed by two. Eight superior and nine inferior labials, sixth upper and fifth or sixth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior a little longer, anterior touching five labials. Scales on body smooth, without pits, in seventeen rows. Anal plate divided. Gastrosteges two hundred and seven. Tail complete. Urosteges one hundred and thirteen, all paired.

The color above is deep olive brown becoming paler posteriorly and seal brown toward the head. A light dorsolateral band, about two scales wide, arises on the upper postocular, crosses the parietal, and continues along the fifth and sixth rows of scales. This yellowish-brown band becomes less distinct on the middle third of the body and nearly obsolete posteriorly. The tail is unicolor, olive, becoming yellowish olive toward the tip. The dark brown postocular or temporal bar is continuous with the brown band on the side of the neck. There is no light nuchal blotch. The labials are yellowish white marked with blackish olive. The first and second rows of scales on the neck are whitish, marked anteriorly with a row of blackish spots, continuous with a similar row formed of one spot near the lateral extremity of each gastrostege from about the fourth to twenty-second. The lower surfaces are yellowish dotted or clouded with grayish olive.

Length to anus, 518 mm.

Length of tail, 217 mm.

Variation.—All the males have seventeen rows of scales, while all of the females have nineteen rows. Careful search of every specimen failed to disclose any scale-pits except in the case of No. 9306, on which one scale showing a single pit was found. The gastrosteges range in number from two hundred and three to two hundred and fourteen. The urosteges in specimens with complete tails vary from ninety-four to one hundred and fourteen in males and from ninety-one to one hundred in females. All of the urosteges are paired except in the specimen from Gardner Island, which has two undivided. The postoculars are always three. The temporals normally are 2+2, and the supralabials eight. The following table shows the scale-counts. In the urostege column c indicates that the tail is complete, while + is affixed to counts when the tip of the tail is missing.

TABLE OF SCALE COUNTS, *Dromicus hoodensis*

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Superior labials | Loreal | |
|------------|-----|------------|--------------|-----------|------------|-------------|-----------|------------------|--------|----------------------------------|
| 9336 | ♂ | 17 | 206 | 105 c | 1 | 3 | 2+2 | 8 | 1 | Type |
| 9370 | ♂ | 17 | 211 | 109 c | 1 | 3 | 2+2 | 8 | 1 | |
| 9420 | ♂ | 17 | 208 | 110 c | 1 | 3 | 2+2 | 8 | 1 | |
| 10920 | ♂ | 17 | 204 | 112 c | 1 | 3 | 2+2 | 8 | 1 | |
| 10957 | ♂ | 17 | 214 | 113 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11799 | ♂ | 17 | 207 | 113 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11800 | ♂ | 17 | 206 | 107 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11896 | ♂ | 17 | 208 | 68 + | 1 | 3 | 2+2 | 8 | 1 | |
| 11921 | ♂ | 17 | 208 | 106 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11923 | ♂ | 17 | 205 | 105 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11931 | ♂ | 17 | 207 | 108 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11932 | ♂ | 17 | 207 | 94 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11934 | ♂ | 17 | 209 | 112 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11936 | ♂ | 17 | 208 | 114 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11937 | ♂ | 17 | 205 | 33 + | 1 | 3 | 2+2 | 8 | 1 | Gardner Island |
| 11939 | ♂ | 17 | 208 | 107 + | 1 | 3 | 2+2 | 8 | 1 | |
| 9304 | ♀ | 19 | ... | 84 + | 1 | 3 | 2+2 | 8 | 1 | |
| 9305 | ♀ | 19 | 205 | 93 c | 1 | 3 | 2+2 | 8 | 1 | |
| 9306 | ♀ | 19 | 208 | 89 + | 1 | 3 | 2+2 | 8 | 1 | |
| 9335 | ♀ | 19 | 210 | 96 + | 1 | 3 | 2+2 | 8-9 | 1 | |
| 9384 | ♀ | 19 | 210 | 80 + | 1 | 3 | 2+2 | 8 | 1 | |
| 10919 | ♀ | 19 | 210 | 90 + | 1 | 3 | 2+2 | 8 | 1 | |
| 10921 | ♀ | 19 | 207 | 92 + | 1 | 3 | 2+2 | 8 | 1 | |
| 10922 | ♀ | 19 | 206 | 94 c | 1 | 3 | 2+2 | 8 | 1 | |
| 10958 | ♀ | 19 | 208 | 90 + | 1 | 3 | 2+2 | 8 | 1 | |
| 11895 | ♀ | 19 | 211 | 96 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11920 | ♀ | 19 | 207 | 95 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11922 | ♀ | 19 | 211 | 95 + | 1 | 3 | 2+2 | 8 | 1 | |
| 11924 | ♀ | 19 | 204 | 95 c | 1 | 3 | 2+2 | 8 | 1 | Stanford Univ. Stanford Univ. |
| 11925 | ♀ | 19 | 209 | 96 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11926 | ♀ | 19 | 205 | 93 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11930 | ♀ | 19 | 207 | 91 c | 1 | 3 | 2+2-1+2 | 9 | 1 | |
| 11933 | ♀ | 19 | 203 | 94 c | 1 | 3 | 2+2 | 8 | 1 | |
| 11935 | ♀ | 19 | 210 | 90 + | 1 | 3 | 2+2 | 8 | 1 | |
| 11938 | ♀ | 19 | 209 | 100 c | 1 | 3 | 2+2 | 8 | 1 | |
| Garman | | 19 | 209 | | 1 | 3 | | 8 | 1 | |
| S.4970 | ♀ | 19 | 212 | 94 + | 1 | 3 | 2+2-2+2 | 8 | 1 | |
| S.4971 | ♂ | 17 | 206 | 98 c | 1 | 3 | 2+2 | 8 | 1 | |
| Brit. Mus. | ♂ | .. | 203 | 104 | .. | .. | | .. | .. | |
| Brit. Mus. | ♂ | .. | 199 | 105 | .. | .. | | .. | .. | |
| Brit. Mus. | ♀ | .. | 211 | | .. | .. | | .. | .. | |

There is very little variation in coloration. All specimens are striped without trace of dorsal spots; and in all, the stripes fade out posteriorly. In specimens with nineteen rows of scales the stripes are on the sixth and seventh rows. All specimens but one show the characteristic spotting on the anterior gastrosteges only, with the white continuation of the

labial streak just above. In the one exception, a young specimen, there are mere traces of the dark spots.

The largest specimen measures 820 mm. from snout to vent, and has a tail 253 mm. long.

Habits.—Nothing is known of the breeding habits of any of the Galapagos snakes. One of the Hood Island specimens (No. 9306) contained the tail of a large *Tropidurus* which it had eaten.

General remarks.—Snakes still are abundant on Hood Island. They seem to differ from those of Charles Island only in coloration; but, since the differences are constant in the large series at hand, they must be regarded as a distinct species.

The sexual difference in the number of scale rows in the snakes of this one island is worthy of note.

Dromicus dorsalis (Steindachner). GALAPAGOS SNAKE

1869, *Dromicus chamissonis* PETERS, Mon. Berlin. Acad., 1869, p. 719; GÜNTHER, Zool. Record, 1869, p. 115 (part); BOULENGER, Cat. Snakes Brit. Mus., II, 1894, p. 119 (part).

1876, *Dromicus chamissonis* var. *dorsalis* STEINDACHNER, Festschr. Zool.-bot. Ges. Wien, 1876, p. 306, pl. I, fig. 1 (type localities **Indefatigable** [probably] or **Jervis islands**).

1876, *Dromicus chamissonis* var. *Habelii* STEINDACHNER, Festschr. Zool.-bot. Ges. Wien, 1876, p. 306, pl. I, fig. 1 (type localities **Indefatigable** [probably] or **Jervis islands**).

1889, *Opheomorphus chamissonis* COPE, Proc. U. S. Nat. Mus., XII, 1889, p. 147.

1892, *Orophis biserialis* GARMAN, Bull. Essex Inst., XXIV, 1892, p. 85 (part).

1903, *Dromicus biserialis biserialis* HELLER, Proc. Washington Acad. Sci., V, 1903, p. 93 (part).

Diagnosis.—Scale-pits present; scales in 19 rows; gastros-
teges 213 to 236; urosteges 95 to 119, usually some unpaired;
postoculars two, rarely one; temporals usually 1+2 or 1+1;
usually striped, sometimes spotted (on Barrington and Inde-
fatigable).

Types.—Vienna Museum. **Galapagos Archipelago**, prob-
ably **Indefatigable** (or **Jervis**). Dr. Habel. 1868.

Distribution.—James, Jervis, Indefatigable, South Seymour and Barrington Islands, Galapagos Archipelago.

Material.—Five specimens collected by Dr. Habel, probably on Indefatigable or Jervis Islands, are in the Vienna Museum. I have examined fifty-one specimens in the Academy collection, as follows: twenty-three from Indefatigable, fifteen from Barrington, eight from James, three from South Seymour, and two from Jervis.

Description of No. 12062.—Adult male. Indefatigable Island. J. R. Slevin. July 16, 1906.

Head fairly broad, with flattened top and rounded snout. Rostral plate large, much broader than high, hollowed below, and bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals smaller than prefrontals. Frontal longer than parietal suture. Anterior and posterior nasals distinct. Loreal well developed, little longer than high. One preocular. Two postoculars. Temporals one followed by two. Eight superior and ten inferior labials, sixth upper and fifth or sixth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior a little longer, anterior touching five labials. Scales on body smooth, many with pits, in nineteen rows. Anal plate divided. Gastrosteges two hundred and twenty. Tail complete. Urosteges one hundred and thirteen, the second to seventh undivided.

The upper surface of the head is yellowish olive dotted with brown. There is a brown band from the rostral to the eye and from the eye to the side of the neck. The labials, chin, and throat are yellowish white dotted with dark brown. The body is longitudinally striped. The lower three (or, on the posterior part of the body, two) rows of scales are grayish brown. The next row is dark brown. The fifth, sixth, and seventh rows are yellowish white. The eighth row is dark brown, and the three rows along the middle of the back are lighter olive brown. The stripes are continued on to the tail, but the distal portion of this region is plain yellowish olive. The lower surfaces are yellowish white irregularly dotted and spotted with dark brown.

Length to anus, 670 mm.

Length of tail, 248 mm.

Variation: Indefatigable Island.—Only two specimens (Nos. 10233 and 10796) have all the urosteges divided. Some specimens have only the second urostege undivided. At the other extreme is No. 10232 in which the second to twenty-second, forty-fifth to forty-eighth, and sixty-third to sixty-fifth, are unpaired. The urosteges range from one hundred and five to one hundred and nineteen, and the gastrosteges from two hundred and seventeen to two hundred and thirty.

TABLE OF SCALE COUNTS, *Dromicus dorsalis* (Steindachner)
INDEFATIGABLE ISLAND

| Number | Sex | Scale row | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal |
|--------|-----|-----------|--------------|-----------|------------|-------------|-----------|--------------|--------|
| 10232 | ♂ | 19 | 224 | 118 c | 1 | 2 | 1+1 | 8 | 1 |
| 10234 | ♂ | 19 | 222 | 117 c | 1 | 2 | 1+2 | 8 | 1 |
| 10235 | ♂ | 19 | 226 | 98 + | 1 | 2 | 1+2 | 8 | 1 |
| 10303 | ♂ | 19 | 219 | 95 + | 1 | 2 | 1+2 | 8 | 1 |
| 10304 | ♂ | 19 | 224 | 99 + | 1 | 2 | 1+1 | 8 | 1 |
| 10305 | ♂ | 19 | 221 | 105 + | 1 | 2 | 1+2 | 8 | 1 |
| 10375 | ♂ | 19 | 225 | 114 c | 1 | 2 | 1+2 | 8 | 1 |
| 10378 | ♂ | 19 | 225 | 107 c | 1 | 2 | 1+2 | 8 | 1 |
| 10379 | ♂ | 19 | 223 | 117 c | 1 | 2 | 1+2 | 8 | 1 |
| 10395 | ♂ | 19 | 226 | 119 c | 1 | 2 | 1+2 | 8 | 1 |
| 10396 | ♂ | 19 | 221 | 110 + | 1 | 2 | 1+2 | 8 | 1 |
| 10559 | ♂ | 19 | 227 | 107 + | 1 | 2 | 1+2 | 8 | 1 |
| 12056 | ♂ | 19 | 224 | 116 c | 1 | 2 | 1+1 | 8 | 1 |
| 12059 | ♂ | 19 | 229 | 105 c | 1 | 2 | 1+2 | 8 | 1 |
| 12062 | ♂ | 19 | 220 | 113 c | 1 | 2 | 1+2 | 8 | 1 |
| 12063 | ♂ | 19 | 218 | 102 + | 1 | 2 | 1+2 | 8 | 1 |
| 12064 | ♂ | 19 | 217 | 112 c | 1 | 2 | 1+2 | 8 | 1 |
| 12065 | ♂ | 19 | 225 | 102 + | 1 | 2 | 1+2 | 8 | 1 |
| 10233 | ♀ | 19 | 228 | 10 + | 1 | 2 | 1+2 | 8 | 1 |
| 10429 | ♀ | 19 | 230 | 107 c | 1 | 2 | 1+2 | 8 | 1 |
| 10560 | ♀ | 19 | 225 | 45 + | 1 | 2 | 1+1 | 8 | 1 |
| 10792 | ♀ | 19 | 229 | 74 + | 1 | 2 | 1+2 | 8 | 1 |
| 10796 | ♀ | 19 | 229 | 105 c | 1 | 2 | 1+2 | 8 | 1 |

The largest snake in the collection is No. 10792 which measures 950 mm. from snout to anus.

All but six of the Indefatigable snakes are colored like the one described above. Seventy-four per cent of the specimens from this island are striped. Of the remaining six specimens, two (Nos. 10233 and 12064) are spotted to the tail, while the other four (Nos. 10235, 10305, 10379, and 10792) are spotted anteriorly, but become nearly unicolor, or at most show only faint spots and bands posteriorly. Nos. 10233, 12064, 10235, and 10305 show longitudinal light stripes more or less clearly on the posterior part of the body. These stripes are wanting in Nos. 10379 and 10792.

The light stripes or nuchal blotches are continued forward very distinctly to the parietals in all Indefatigable specimens except 10235, 10305, 10379, 10396, and 10792. The light stripes, when present, never are confined to the scales of two rows, as is the case in snakes from Barrington.

South Seymour Island.—Two of the three specimens at hand have more numerous gastrosteges than have been found

in any specimen from Indefatigable, James, Jarvis, or Barrington islands. The third has a number equaled by only one Indefatigable specimen. In other respects these snakes are like the Indefatigable striped specimens, except that the coloring is a little lighter and brighter.

TABLE OF SCALE COUNTS, *Dromicus dorsalis* (Steindachner)
SOUTH SEYMOUR ISLAND

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal |
|--------|-----|------------|--------------|-----------|------------|-------------|-----------|--------------|--------|
| 10483 | ♂ | 19 | 232 | 88 + | 1 | 2 | 1+2 | 8 | 1 |
| 10485 | ♂ | 19 | 230 | 113 c | 1 | 2 | 1+2 | 8 | 1 |
| 10486 | ♀ | 19 | 236 | | 1 | 2-3 | 1+2 | 8 | 1 |

James Island.—The James Island snakes show no important differences from the Indefatigable series. Nos. 10782 and 12153 have all urosteges paired. No. 12091 has the second to twenty-first undivided. No. 12092 has a similar condition in the sixth to eighth, tenth to fifteenth, seventeenth, nineteenth, twenty-first to twenty-third, twenty-seventh, and one-hundredth to one-hundred-and-third. All the others have some unpaired. The temporals usually are one followed by one. Variation in other scale-characters is shown in the following table:

TABLE OF SCALE COUNTS, *Dromicus dorsalis* (Steindachner)
JAMES ISLAND

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal |
|--------|-----|------------|--------------|-----------|------------|-------------|--------------|--------------|--------|
| 12091 | ♂ | 19 | 217 | 91 + | 1 | 2 | 1+1 | 8 | 1 |
| 12092 | ♂ | 19 | 215 | 104 + | 1 | 2 | { 1+1 1+2 | 8 | 1 |
| 12094 | ♂ | 19 | 213 | 68 + | 1 | 2 | 1+1 | 8 | 1 |
| 12154 | ♂ | 19 | 213 | 72 + | 1 | 2 | { 1+1 1+2 | 8 | 1 |
| 12155 | ♂ | 19 | 213 | 101 c | 1 | 2 | 1+1 | 8 | 1 |
| 10782 | ♀ | 19 | 226 | 74 + | 1 | 2 | { 1+1 1+2 | 8 | 1 |
| 12093 | ♀ | 19 | 221 | 85 + | 1 | 2 | { 1+1 1+2 | 8 | 1 |
| 12153 | ♀ | 19 | 220 | 94 + | 1 | 2 | { 1+1 1+2 | 8 | 1 |

All the specimens are striped. The stripes are clear and distinct except in Nos. 12093, 12094 and 12154, in which they are more or less obsolete behind the neck. They are continued to the parietals, and usually involve the scales of three rows.

Jervis Island.—Two specimens from Jervis seem to agree perfectly in squamation and coloring with the James Island snakes.

TABLE OF SCALE COUNTS, *Dromicus dorsalis* (Steindachner)
JERVIS ISLAND

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal |
|--------|-----|------------|--------------|-----------|------------|-------------|--|--------------|--------|
| 10610 | ♂ | 19 | 220 | 95 + | 1 | 2 | $\begin{cases} 1+1 \\ 1+2 \end{cases}$ | 8 | 1 |
| 10611 | ♀ | 19 | 226 | 81 + | 1 | 2 | $\begin{cases} 1+1 \\ 1+1 \end{cases}$ | 8 | 1 |

Barrington Island.—I have before me fifteen snakes from Barrington. All but four of these have a few urosteges undivided. The variation in important scale-characters is set forth below. The tendency toward a reduction in the number of temporals and postoculars will be noted.

TABLE OF SCALE COUNTS, *Dromicus dorsalis* (Steindachner)
BARRINGTON ISLAND

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal |
|------------|-----|------------|--------------|-----------|------------|-------------|--|--------------|--------|
| 10147 | ♂ | 19 | 223 | 86 + | 1 | 2 | 1+1 | 8 | 1 |
| 10152 | ♂ | 19 | 220 | 95 c | 1 | 2 | 1+3 | 8 | 1 |
| 10182 | ♂ | 19 | 218 | 41 + | 1 | 2 | 1+3 | 8 | 1 |
| 10183 | ♂ | 19 | 218 | 98 + | 1 | 2 | 1+1 | 8 | 1 |
| 10215 | ♂ | 19 | 218 | 52 + | 1 | 2 | 1+1 | 8 | 1 |
| 10217 | ♂ | 19 | 222 | 104 c | 1 | 2 | 1+1 | 8 | 1 |
| 10226 | ♂ | 19 | 219 | 56 + | 1 | 1-2 | 1+1 | 8 | 1 |
| 12061 | ♂ | 19 | 215 | 87 + | 1 | 1-2 | $\begin{cases} 1+1 \\ 1+3 \end{cases}$ | 8 | 1 |
| 10150 | ♀ | 19 | 227 | 81 + | 1 | 1-2 | 1+1 | 8 | 1 |
| 10151 | ♀ | 19 | 229 | 86 + | 1 | 1-2 | 1+1 | 8 | 1 |
| 10213 | ♀ | 19 | 223 | 86 + | 1 | 2 | 1+3 | 8 | 1 |
| 10214 | ♀ | 19 | 229 | 61 + | 1 | 1-2 | 1+3 | 8 | 1 |
| 10216 | ♀ | 19 | 226 | 65 + | 1 | 2 | 1+1 | 8 | 1 |
| 12055 | ♀ | 19 | 223 | 73 + | 1 | 2 | 1+1 | 8 | 1 |
| 12060 | ♀ | 19 | 227 | 76 + | 1 | 2 | 1+1 | 8 | 1 |
| Brit. Mus. | ♂ | .. | 224 | | .. | .. | | .. | .. |

Two styles of coloration are exhibited by the snakes of Barrington. Seven specimens (Nos. 10151, 10152, 10183, 10213, 10214, 10217, 10226) are striped, while eight (Nos. 10147, 10150, 10182, 10215, 10216, 12055, 12060, 12061) are spotted. The difference here, as on Indefatigable, is due neither to age nor sex. It must be regarded as a form of dichromatism. In the spotted specimens, the longitudinal light stripes are represented only by a pair of short longitudinal yellowish-white blotches on the nape. In striped specimens, the light stripes are confined to the scales of two rows. In all specimens, the light nuchal blotches or the longitudinal stripes end anteriorly sharply and definitely several scales behind the parietals. In all spotted specimens, the dark brown spots or blotches become obsolete posteriorly; while, in all striped specimens, the light bands extend to the tail.

General Remarks.—It is probable that larger series may result in the recognition of subspecies of *Dromicus dorsalis*. Even now the peculiarities of coloration, with the frequent reduction in temporals and postoculars, almost justify the separation of the Barrington Island snakes. The serpents of Indefatigable and Seymour appear to differ from those of the other islands in the possession of a greater number of urosteges, but so many of the specimens have lost the tips of their tails that more evidence is needed. Inconstant as the differences may prove to be, I believe that the following tentative key may prove useful to future investigators.

a.—Stripes or nuchal blotches ending definitely several scales behind parietals; stripes narrow.

Temporals usually 1+1; postoculars often 1; urosteges fewer.
Barrington.

a.²—Stripes or nuchal blotches usually continued forward to parietals; stripes wider.

b.—Urosteges more numerous; temporals usually 1+2; spotted or striped.

Indefatigable and Seymour.

b.²—Urosteges fewer; temporals usually 1+1; striped.
James and Jervis.

We do not know why so many of these snakes have lost the tips of their tails, but Mr. Slevin reports that the mocking-birds were observed picking at the tails of *Tropiduri* until they fell off and could be eaten.

***Dromicus occidentalis*, new species. NARBOROUGH ISLAND
SNAKE**

1903, *Dromicus biserialis biserialis* HELLER, Proc. Washington Acad. Sci., V, 1903, p. 93 (part).

Diagnosis.—Scale-pits present; scales in 19 rows; gastrosteges 236 to 252; postoculars two; temporals 1+1 or 1+2; striped (or rarely spotted), light nuchal blotches and series of dark spots on tips of gastrosteges and on lower lateral scales very distinct.

Type.—Adult female. California Academy of Sciences No. 11488. Narborough Island, Galapagos Archipelago. J. R. Slevin. April 18, 1906.

Distribution.—Narborough Island, Galapagos Archipelago.

Material.—Mr. Heller has recorded four snakes from Narborough, now forming a part of the collection of Stanford University, where I have examined them. The Academy has received only two from Narborough.

Description of the type.—Head rather broad, with flattened top and rounded snout. Rostral plate large, much broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals much smaller than prefrontals. Frontal longer than parietal suture. Anterior and posterior nasal distinct. Loreal well developed, longer than high. One preocular. Two postoculars. Temporals one followed by two, or one followed by one. Eight superior and ten inferior labials, sixth upper and fifth or sixth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior a little longer, anterior touching four labials. Scales on body smooth, many with pits, in nineteen rows. Anal plate divided. Gastrosteges two hundred and forty-seven. Tail incomplete. Urosteges ninety-eight, all paired.

The top of the head is dark brown mottled with olive gray. A light brown band extends from the rostral plate to the eye, and a dark brown postocular blotch crosses the temporal region to the side of the neck. The labials and lower surfaces of the head and throat are olive gray marbled with dark brown. On each side of the body there is a light yellowish-gray longitudinal stripe along the sixth and seventh rows of scales. On the posterior portion of the body, where there are only seventeen rows of scales, this stripe drops to the fifth and sixth rows. It is continued beyond the middle of the tail; but on the neck, as far as the twenty-fifth gastrostege, it is represented by a series of nine large, rounded, light spots. Along the back between these light stripes is a band of dark brown, darker on the scales bordering the light stripes. The sides are dark brown close to the lateral light stripes, but become grayish olive toward the gastrosteges. On the anterior half of the body, most of the scales of the second row, and a few of those of the first, bear central spots of dark brown. Similar small

blackish-brown spots on the tip of each gastrostege form a row extending nearly to the tail. The lower surfaces are yellowish with numerous small blackish spots.

Length to anus, 890 mm.

Length of tail, 252 mm.

Variation.—No. 11509 has the first eleven urosteges undivided. These scales are all paired in all of the other specimens except No. 4974 of the Stanford University collection, in which the first urostege is unpaired. The following table shows the principal variation in squamation.

TABLE OF SCALE COUNTS, *Dromicus occidentalis*, new species.

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal |
|--------|-----|------------|--------------|-----------|------------|-------------|--|--------------|--------|
| 11509 | ♂ | 19 | 237 | 56 + | 1 | 2 | $\begin{cases} 1+1 \\ 2+2 \end{cases}$ | 8 | 1 |
| 11488 | ♀ | 19 | 247 | 98 + | 1 | 2 | $\begin{cases} 1+1 \\ 2+2 \end{cases}$ | 8 | 1 |
| S.4974 | ♂ | 19 | 239 | 116 c | 1 | 2 | 1+2 | 8 | 1 |
| S.4975 | ♂ | 19 | 236 | 112 c | 1 | 2 | 1+2 | 8 | 1 |
| S.4973 | ♀ | 19 | 252 | 91 + | 1 | 2 | $\begin{cases} 1+1 \\ 1+2 \end{cases}$ | 8 | 1 |
| S.4976 | ♀ | 19 | 243 | 109 c | 1 | 2 | 1+2 | 8 | 1 |

All the Narborough specimens have the characteristic light nuchal blotches and dark spots on gastrosteges and lower lateral scales. The dark spots on the lower laterals are most numerous on the scales of the first row in all specimens except the type. The row of spots along the tips of the gastrosteges extends to the vent in No. S. 4975 and S. 4976, nearly to the vent in No. S. 4974, and past the middle of the body in No. S. 4973. All the specimens show the longitudinal light stripes except No. S. 4975, which is spotted without any trace of stripes. The general dorsal coloration of this specimen is similar to that of the snakes of Albemarle and Brattle, but it shows the light blotches on the nape, and dark spots on gastrosteges and laterals, which are characteristic of the Narborough snakes. No. 11509 is intermediate in coloration between No. S. 4975 and the other Narborough specimens. It shows both stripes and spots most distinctly.

General remarks.—The snakes of Narborough agree with those of Albemarle and Brattle in the large number of their

gastrosteges, a character which distinguishes them from all other Galapagos snakes. They seem to differ from those of Albemarle and Brattle only in coloration; and, since two specimens show a tendency to vary in the direction of the Albemarle form, it seems best to regard those from Albemarle as a subspecies.

***Dromicus occidentalis helleri*, new subspecies. HELLER'S
GALAPAGOS SNAKE**

1903, *Dromicus biserialis biserialis* HELLER, Proc. Washington Acad. Sci., V, 1903, p. 93 (part).

Diagnosis.—Scale-pits present, scales in 19 rows; gastrosteges more than 236; postoculars two; temporals 1+2 or 2+2, spotted, no longitudinal light stripes; no series of definite rounded blackish spots on lateral scales of first and second rows; light nuchal markings much less prominent, and dark spots on tips of gastrosteges absent or less distinct than in the Narborough form.

Type.—Male. California Academy of Sciences No. 10280. Brattle Island, Galapagos Archipelago. J. R. Slevin. October 30, 1905.

Distribution.—Albemarle and Brattle Islands, Galapagos Archipelago.

Material.—Mr. Heller has recorded one specimen from near Cape Berkeley, Albemarle, which now is No. 4977 of the Stanford University collection. The Academy has received two from Brattle.

Description of the type.—Head rather broad, with flattened top and rounded snout. Rostral plate large, much broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals smaller than prefrontals. Frontal longer than parietal suture. Anterior and posterior nasals distinct. Loreal well developed, little longer than high. One preocular. Two postoculars. Temporals one followed by two. Eight superior and ten inferior labials, sixth upper and fifth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior longer, anterior touching four or five labials. Scales on body smooth, many with pits, in nineteen rows. Anal plate divided. Gastrosteges two hundred and forty. Tail complete. Urosteges one hundred and twelve, the first to third, seventh to eleventh, and fourteenth and fifteenth not divided.

The top of the head is olive brown dotted with olive gray. A light brown band extends from the rostral plate to the eye, and a brown post-

ocular blotch crosses the temporal region to the side of the neck. The labials and lower surfaces of the head and throat are yellowish-gray marbled with dark gray. There are no light longitudinal stripes on the body. The color above shades from brownish olive along the middle of the back to pale olive gray near the gastrosteges. On the neck are large round dark brown spots separated by light yellowish-gray blotches. On the anterior part of the body these dark spots become smaller and more numerous, and form three alternating rows on each side. These spots become smaller and less numerous posteriorly, and are lacking on the tail. They also tend to avoid the sixth and seventh rows of lateral scales. The lower surfaces are yellowish mottled with brownish gray except on the tail. Many of the tips of the gastrosteges bear not very definite small dark brown spots, but there is no series of such spots on the lower lateral scales.

Length to anus, 542 mm.

Length of tail, 178 mm.

Variation.—The Albemarle specimen has the upper post-ocular of one side united with the parietal. It has eight superior and ten inferior labials, the fourth and fifth upper reaching eye, the sixth in each series largest, five inferior in contact with the anterior genial. Both it and No. 10281, from Brattle, have all urosteges divided.

TABLE OF SCALE COUNTS, *Dromicus occidentalis helleri*, new sub-species

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal | Locality |
|--------|-----|------------|--------------|-----------|------------|-------------|--|--------------|--------|-----------|
| 10280 | ♂ | 19 | 240 | 112 c | 1 | 2 | 1+2 | 8 | 1 | Brattle |
| 10281 | ♀ | 19 | 248 | 98 + | 1 | 2 | 1+2 | 8 | 1 | Brattle |
| S.4977 | ♀ | 19 | 241 | 88 + | 1 | 1-2 | $\begin{cases} 1+2 \\ 2+2 \end{cases}$ | 8 | 1 | Albemarle |

The two Brattle snakes are absolutely alike in coloration, and the Albemarle specimen is very similar, as will be seen from the following description of Stanford University No. 4977, adult female, from vic. Cape Berkeley, Albemarle Island.

The head is brownish olive marbled with black. There is a dark post-ocular or temporal streak. The labials are mottled with lighter. There are no longitudinal light lines. The upper surfaces are dark brown spotted with darker brown or black. On the neck, these spots are large, round and very distinct and well defined. On the body, they are smaller and become perhaps less distinct toward the tail. Still, they form, throughout the whole length of the body, two alternating rows usually on the fifth and eighth rows of scales of each side, dropping to the fourth and seventh rows posteriorly. There are two or three pairs of whitish blotches on the nape. The lower surfaces are yellowish irregularly spotted with brownish black. Almost every gastrosteg on the anterior two-thirds of the body shows a definite blackish spot near its outer extremity on each side as in the Narborough snakes, but there are no similar spots on the first row of scales.

General remarks.—I take pleasure in naming this snake after Mr. Edmund Heller who collected the Albemarle specimen while a member of the Hopkins-Stanford Galapagos Expedition in 1898-99.

Dr. Boulenger writes me that the British Museum has a young spotted snake said to have been collected at Tagus Cove, Albemarle. It has one hundred and twelve urosteges, but only two hundred and twenty-two gastrosteges. This small number of gastrosteges makes me think that an error may have been made in the locality label. The specimen has scales with two pits, and one would incline to the opinion that it has originated on Barrington or Indefatigable. If, however, there has been no mistake in the label, the Tagus Cove snakes must represent a species distinct from that found at Banks Bay; and it may be that larger collections will show that each of the five large mountains of Albemarle has its own peculiar race of serpent.

***Dromicus slevini*, new species. SLEVIN'S SNAKE**

1903, *Dromicus biserialis biserialis*, HELLER, Proc. Washington Acad. Sci., V, 1903, p. 93 (part).

Diagnosis.—No scale-pits; scales in 19 rows; gastrosteges 170 to 183; urosteges 82 to 104; no longitudinal light stripes.

Type.—Male. California Academy of Sciences No. 12,216. Duncan Island, Galapagos Archipelago. August 14, 1906.

Distribution.—Duncan, Narborough, and Cowley Mountain, Albemarle.

Material.—Three specimens are known. Two are in the Academy collection, while the one from Narborough belongs to Stanford University.

Description of the type.—Head rather broad, with flattened top and rounded snout. Rostral plate large, broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals much smaller than prefrontals. Frontal slightly shorter than parietal suture. Anterior and posterior nasals distinct. Loreal well developed, longer than high. One preocular. Two postoculars. Temporals two followed by two, or one followed by one. Eight superior and ten inferior labials, sixth upper and sixth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior a little longer, anterior touching five labials. Scales on body smooth, without pits, in nineteen rows. Anal plate

divided. Gastrosteges one hundred and eighty-three. Tail complete. Urosteges one hundred and four, all paired except the first to fourth.

The head is brownish olive above, with whitish spots on the labials and a dark brown postocular streak. The back is crossed by about fifty-five black cross-bars separated by narrower brownish-white ones. In some places the black bars are not quite continuous, tending to alternate at the mid-dorsal line with those of the opposite side of the body. These black cross-bars extend down on the sides to about the second row of scales. The other lateral scales are of a brownish-gray color, continuous with the light cross-bars, and are sometimes outlined with black. The tail is provided with about thirty blackish-brown blotches proximally, becoming unicolor toward the tip where it is olive. The lower surfaces are grayish, more or less dotted with slate, and the base of each gastrostege shows a more or less concealed blackish cross-bar.

Length to anus, 228 mm.

Length of tail, 95 mm.

Variation.—The principal variation in scale characters is set forth in the following table.

TABLE OF SCALE COUNTS, *Dromicus slevini*, new species

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal | Locality |
|--------|-----|------------|--------------|-----------|------------|-------------|--|--------------|--------|------------|
| 12216 | ♂ | 19 | 183 | 104 c | 1 | 2-2 | $\begin{cases} 2+2 \\ 1+1 \end{cases}$ | | 1 | Duncan |
| 12159 | ♀ | 19 | 170 | 82 c | 1 | 2-2 | 2+2 | 8 | 1 | Cowley Mt. |
| S.4972 | ♀ | 19 | 179 | 96 c | 1 | 2-2 | $\begin{cases} 2+2 \\ 2+3 \end{cases}$ | 8 | 1 | Narborough |

In all the specimens except the type all of the urosteges are divided, and the frontal is slightly longer than the parietal suture. Neither the Duncan nor the Cowley Mountain specimen shows any trace of longitudinal light stripes. Both are, in general, black with vertical light bars on the sides. In the Duncan snake most of these light bars cross the back; while in the Cowley specimen they do not extend above the lateral regions, leaving a black dorsal band three or four scales wide. The Narborough specimen agrees in coloration with that from Cowley Mountain. The Cowley specimen has about eighty-five light bars on the upper part of each side, where the Narborough snake has only seventy-one, and the Duncan about fifty-five. In the Cowley and Narborough snakes these light bars fork inferiorly and, joining with branches of the preceding

and succeeding bars, outline alternating dark spots on the lower lateral scales.

The largest specimen of *D. slevini* is that from Cowley Mt., Albemarle Island, which measures 347 mm. from snout to anus, and 135 mm. from anus to tip of tail.

Habits.—The Duncan Island snake contains the foot and tail of a gecko which it had eaten.

General Remarks.—The Cowley Mountain snake was taken August 11, 1906, on a field of pumice stone at an elevation of about 200 feet. Mr. Slevin's notes state that it was the only snake secured on Albemarle, and differed in coloration from any taken elsewhere.

Under date of August 14, 1906, Mr. Slevin wrote: "Anchored off Duncan about ten A. M. I collected on the northeast slope of the island to about 800 feet. Got a snake at about 400 feet. It appeared different from any taken thus far. It was very well colored to prevent detection. It was secured on a lava block covered with silver colored lichen which matched the snake exactly. One was reported by Mr. Hunter during our last stop at Duncan, which, he said, was similar in coloring to the one taken today."

Mr. Drowne of the Webster-Harris Expedition reports¹ having seen on Duncan Island, September 9, 1897, a snake that was about one and a half feet long, slender and blackish, with white rings.

It is probable that more abundant material will show that more than one species has been included here under the name *Dromicus slevini*.

***Dromicus steindachneri*, new species. STEINDACHNER'S SNAKE**

Diagnosis.—No scale-pits; scales in 19 rows; gastrosteges 169 to 180; urosteges 96 to 114; longitudinal light stripes present.

Type.—Male. California Academy of Sciences No. 10795. Indefatigable Island, Galapagos Archipelago. J. R. Slevin. Jan. 16, 1906.

Distribution.—This species has been found on Indefatigable, South Seymour and Jarvis islands. It is probable that more

¹ Novitates Zool. VI, p. 117.

extensive collecting will show that it is present also on James and Barrington.

Material.—We have received five specimens. Two are from Jervis, two from South Seymour and one from Indefatigable.

Description of the type.—Head rather broad, with flattened top and rounded snout. Rostral plate large, broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are: a pair of internasals, a pair of prefrontals, supraocular and part of preocular of each side, a frontal, and a pair of large parietals. Internasals much smaller than prefrontals. Frontal slightly longer than parietal suture. Anterior and posterior nasals distinct. Loreal well developed, longer than high. One preocular. Two postoculars. Temporals two followed by two, or one followed by one. Eight superior and ten inferior labials, sixth upper and sixth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior a little longer, anterior touching five labials. Scales on body smooth, without pits, in nineteen rows. Anal plate divided. Gastrosteges one hundred and sixty-nine. Tail complete. Urosteges ninety-six, all paired.

The head is brownish olive above. There is a dark brown postocular streak. The labials and most of the other scales on the side of the head are yellowish gray with dark borders. The general color above is blackish brown. A light yellowish-gray stripe runs along each side of the neck, body, and tail. This streak is on the scales of the sixth, seventh, and eighth rows on the neck, and of the fifth, sixth, seventh and sometimes eighth on the body, except posteriorly where it drops to the fourth, fifth, and sixth rows. Many of the lateral scales have light central spots of the same color as the longitudinal stripes. The lower surfaces are light yellowish gray. There is a blackish cross-bar at the base of each gastrosteg, and usually a blackish blotch on each side of the center of each gastrosteg. The urosteges are light gray outlined with blackish brown.

Length to anus, 290 mm.

Length of tail, 130 mm.

Variation.—The principal variation in scale-characters is set forth in the following table. It will be noted that the Jervis and South Seymour snakes have three postoculars, while the Indefatigable specimen has only two.

TABLE OF SCALE COUNTS, *Dromicus steindachneri*, new species.

| Number | Sex | Scale rows | Gastrosteges | Urosteges | Preoculars | Postoculars | Temporals | Supralabials | Loreal | Locality |
|--------|-----|------------|--------------|-----------|------------|-------------|--------------|--------------|--------|---------------|
| 10612 | ♂ | 19 | 180 | 114 c | 1 | 3-3 | { 2+2 2+3 | 8 | 1 | Jervis |
| 10617 | ♀ | 19 | 176 | 97 c | 1 | 3-3 | 2+2 | 8 | 1 | Jervis |
| 10795 | ♂ | 19 | 169 | 96 c | 1 | 2-2 | { 2+2 1+1 | 8 | 1 | Indefatigable |
| 10482 | ♀ | 19 | 176 | 72 + | 1 | 3-3 | 2+2 | 8 | 1 | Seymour |
| 10484 | ♀ | 19 | 176 | 58 + | 1 | 3-3 | { 2+2 2+3 | 8 | 1 | Seymour |

The Jervis, Seymour and Indefatigable specimens all have light longitudinal stripes. The stripes are similar in position and color to those of *Dromicus dorsalis*. The whole coloration is so like that of striped specimens of *D. dorsalis* that the two species readily pass as one, until the scales are examined and the gastrosteges counted. On closer examination, however, one notes that in *D. steindachneri* the longitudinal light lines are broader, being three or four scales wide, each of the lateral scales has a central light area, and there usually is a blackish cross-bar at the base of each gastrosteg, and often a blackish blotch on each side of the center of each gastrosteg. The dorsal scales also sometimes have light centers. In the Jervis specimens the lower lateral scales are nearly as light as the light stripe. In No. 10617 a dark brown line runs along the lower border of the light stripe.

The largest specimen measures 365 mm. from snout to vent.

Habits.—From the stomach of No. 10484 from South Seymour were taken the remains of a grasshopper.

General remarks.—This interesting little snake is most closely related to *Dromicus slevini*. It is probable that both are either quite rare or very retiring in habits.

It is a pleasure to associate with this handsome little species the name of Dr. Franz Steindachner, who was among the first to study the snakes of the Galapagos Archipelago.

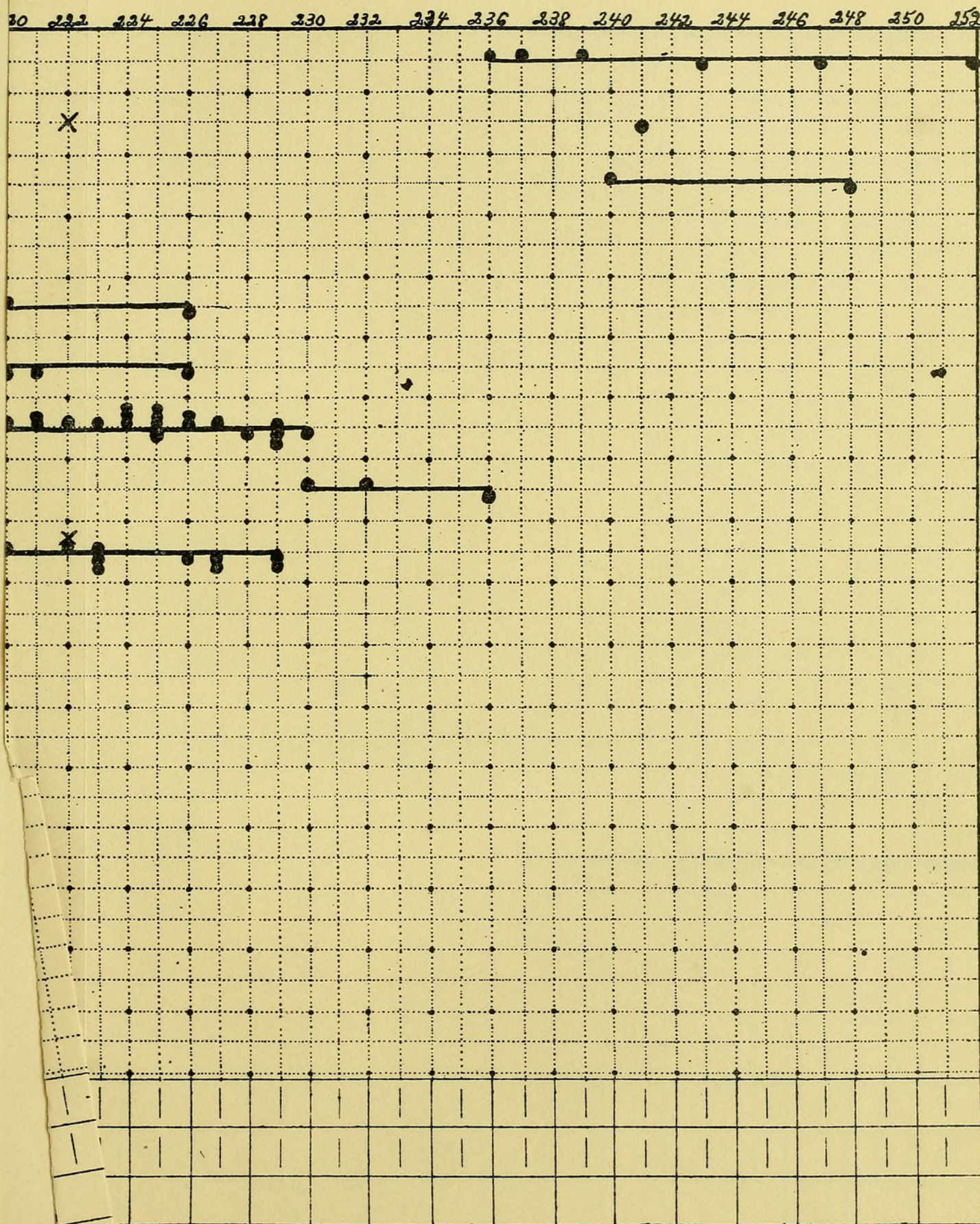
Hydrus platurus (Linnæus). BICOLOR SEA-SNAKE

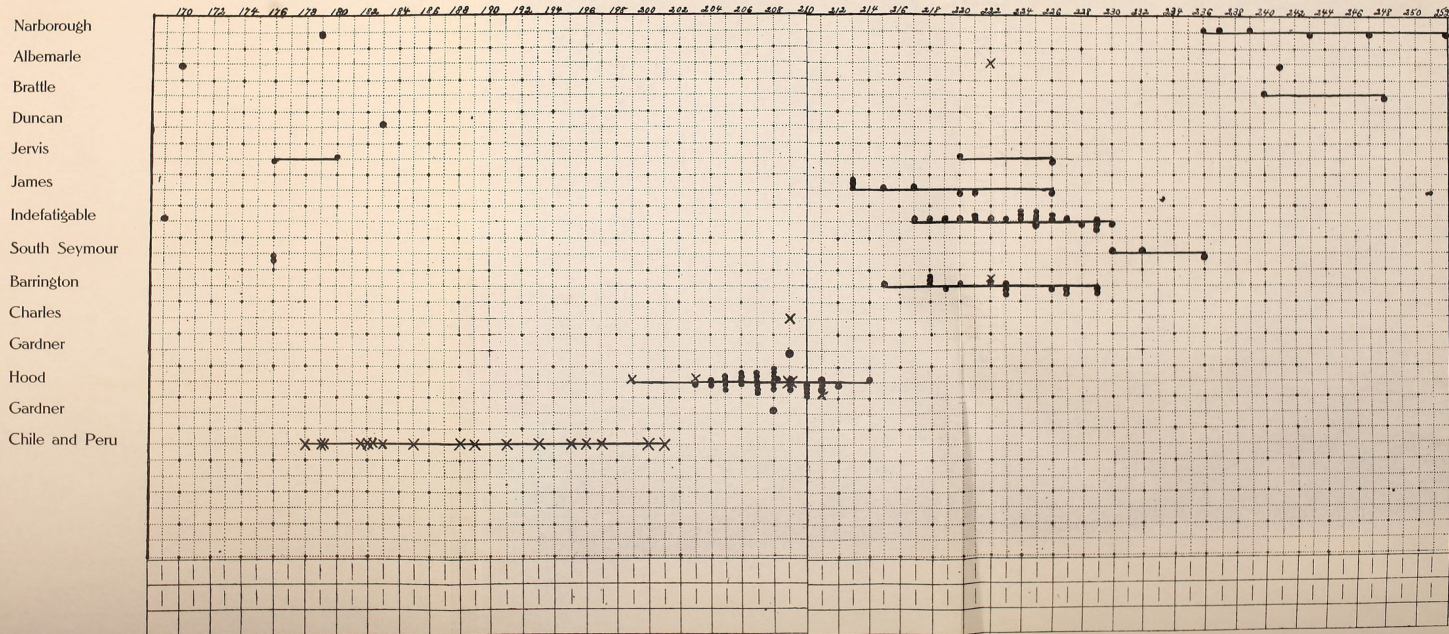
No specimens of this snake have been taken in the Galapagos Archipelago, but the following note from Mr. Slevin's diary shows that it occurs there.

"Feb. 24, 1906. Sailed [from Chatham] for Hood Island. This afternoon at 4:15, Stewart sighted a sea-snake. King also saw it, and the boat was put out immediately, but we failed to get it, as it went under. King said it was about twenty inches long, black on the top and bright yellow below. We had some headway on, so passed it fairly quickly. This is the first one seen. Weather is very hot now and has been for the last few days. Light winds and strong currents make it hard to get around, and we have not made much progress during the day. Barrington, Chatham, Hood and Charles are in sight."

EXPLANATION OF PLATE XXII

Chart of the gastrostegae counts in specimens of *Dromicus*. Dots indicate counts on specimens in the Academy and Stanford collections. Dots above the line are males, those below, females. Crosses indicate records from specimens not examined by me.

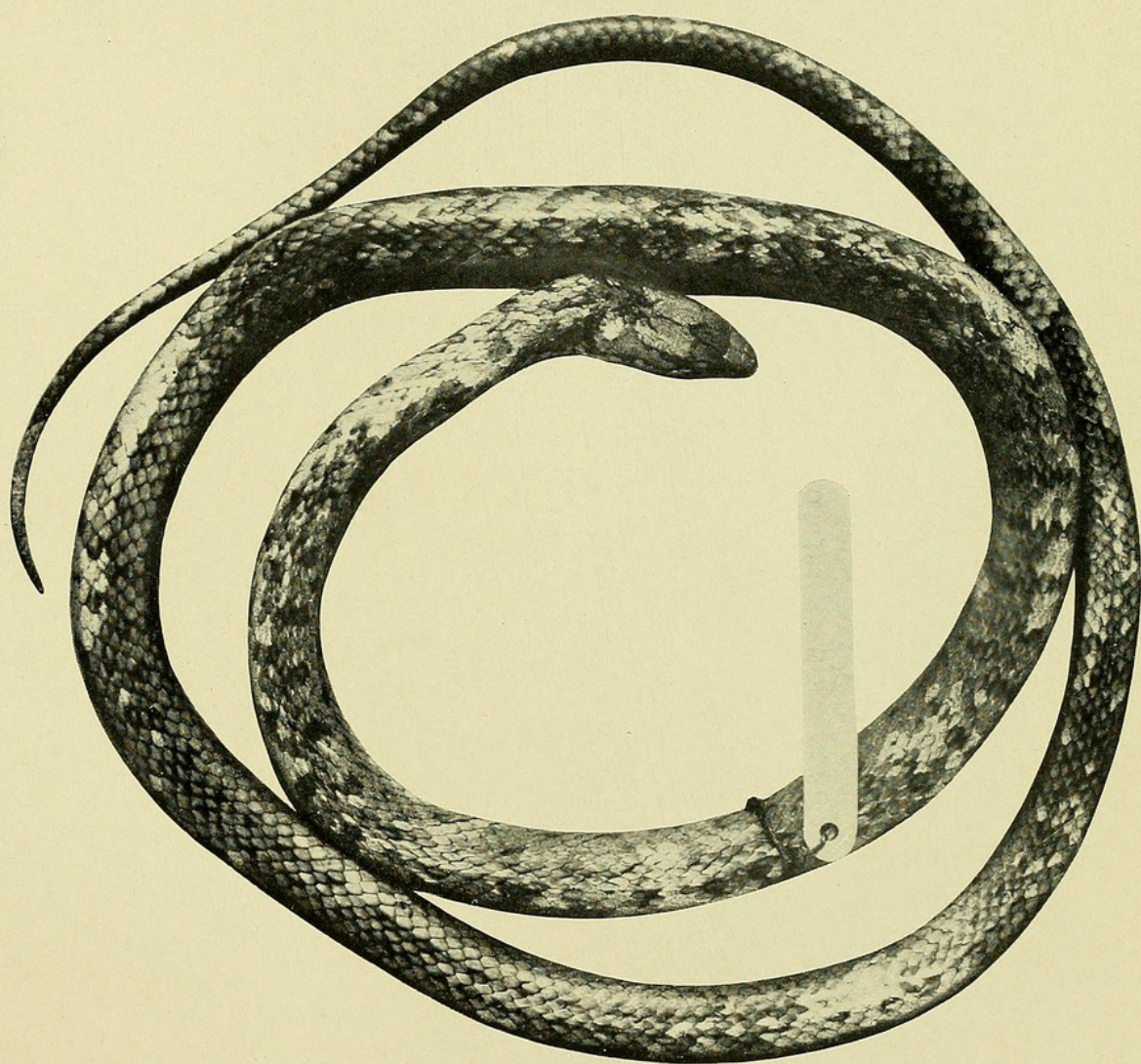




EXPLANATION OF PLATE XXIII

Dromicus biserialis (Günther).

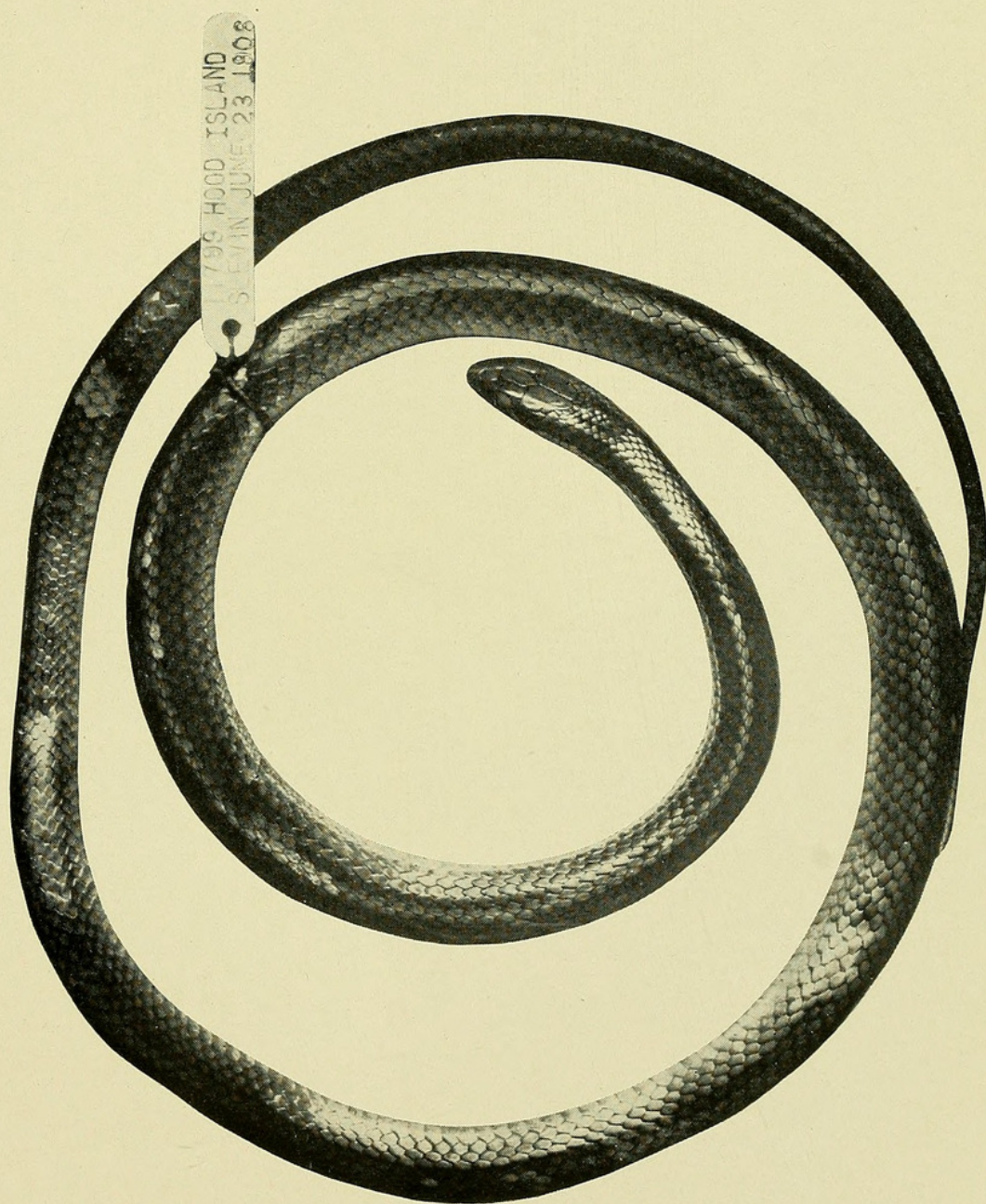
No. 9448. Gardner Island, near Charles Island. Female.



EXPLANATION OF PLATE XXIV

Dromicus hoodensis new species

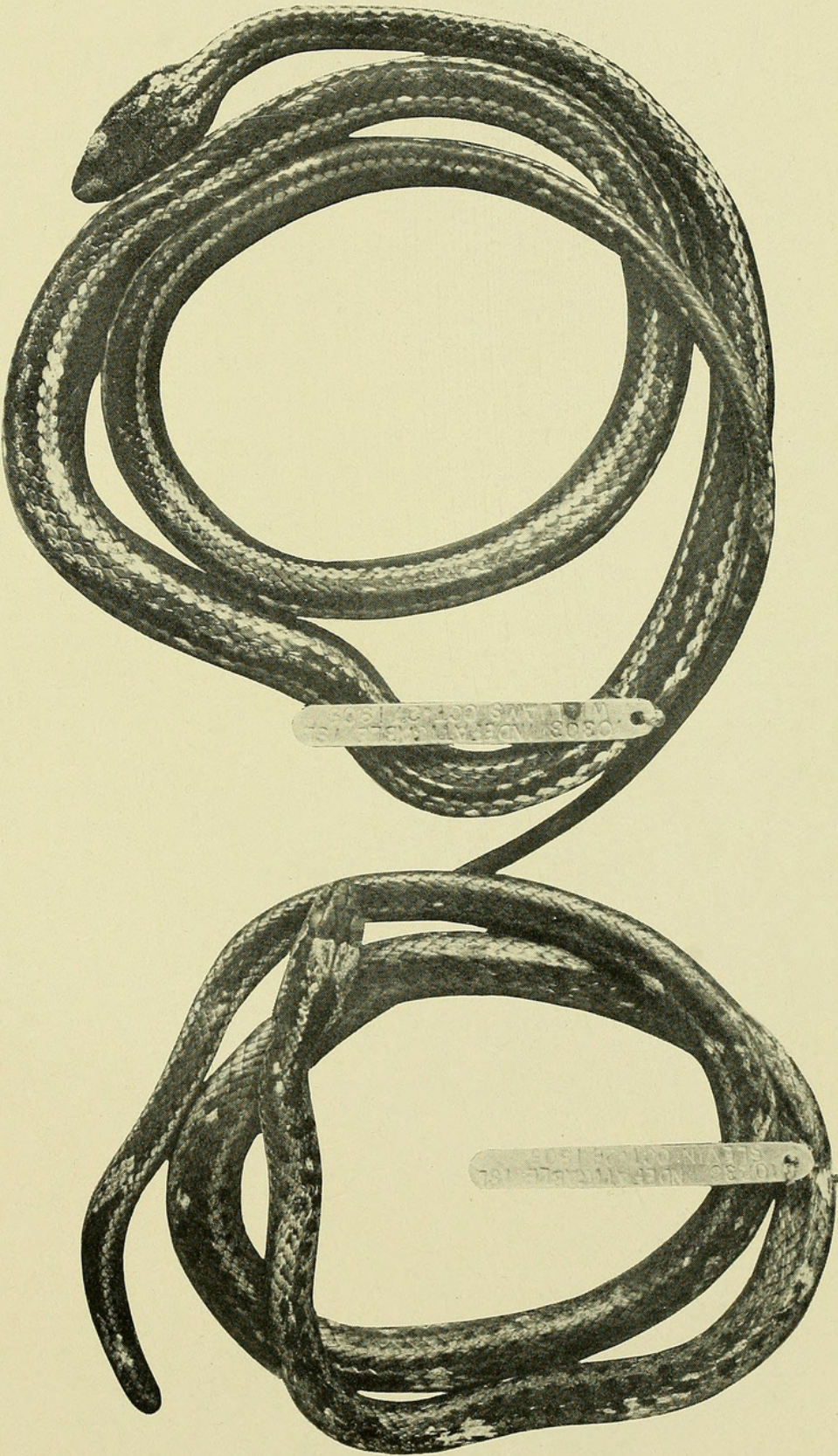
No. 11799. Type. Hood Island. Male.



EXPLANATION OF PLATE XXV

Dromicus dorsalis (Steindachner)

No. 10303. Indefatigable Island. Male. Striped.
No. 10233. Indefatigable Island. Female. Spotted.



EXPLANATION OF PLATE XXVI

Dromicus dorsalis (Steindachner)

| | | | |
|------------|--------------------|-------|----------|
| No. 10183. | Barrington Island. | Male. | Striped. |
| No. 12061. | Barrington Island. | Male. | Spotted. |



Van Denburgh, John. 1912. "The snakes of the Galapagos Islands."
Proceedings of the California Academy of Sciences, 4th series 1, 323–374.

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