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The dates at which these separate papers are published are recorded in the tables of contents of each of the volumes.

The present volume is the ninety-seventh of this series.

The *Bulletin*, the first of which was issued in 1875, consists of a series of separate publications comprising monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, catalogs of type specimens, special collections, and other material of similar nature. The majority of the volumes are octavo in size, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable. In the *Bulletin* series appear volumes under the heading *Contributions from the United States National Herbarium*, in octavo form, published by the National Museum since 1902, which contain papers relating to the botanical collections of the Museum.

ALEXANDER WETMORE,
Secretary, Smithsonian Institution.

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PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM

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MAMMALS OF NORTHERN COLOMBIA

PRELIMINARY REPORT NO. 1: SQUIRRELS (SCIURIDAE)

By Philip Hershkovitz

In this and succeeding accounts of the mammals collected by the author in northern Colombia during the first 2 years of his tenure of the Walter Rathbone Bacon Traveling Scholarship, those animals requiring special taxonomic treatment will be discussed. The final report on the collection will contain a complete and annotated list of the mammals, a full description of the region and the individual collecting stations, an account of the itinerary, and the general conclusions to be derived from a study of the classification, distribution, and ecology of the mammals of the region. Acknowledgment will be made to the institutions and the many individuals who enabled the author to prepare these accounts.

During the course of the field work special attention was given to the collecting of sciurids. Two species of squirrels were found, and it is almost certain that more do not occur in the region. The first species, the pigmy squirrel, genus *Microsciurus*, is represented by two specimens from the Río San Pedro, near Norosí, Bolívar Department. These are here assigned to *Microsciurus alfari* Allen, the oldest available specific name for the genus. It is unlikely that valid specific differences exist between any of the described forms.

The second species found is represented by 225 specimens. For this, the generally overlooked name of *Sciurus granatensis* Humboldt is applicable. This highly variable species is shown to be the equivalent of most of (if not all) the "species" of the defunct "genus" *Mesosciurus* and liquidates the heretofore admitted genus, or subgenus, *Notosciurus* with its single species, *rhoadsi*.

The author expresses his thanks to the authorities of the American Museum of Natural History for the loan of specimens and permission to examine the type specimens in their charge; to the authorities of the Chicago Natural History Museum for the loan of specimens and permission to describe one of the squirrels in their collection; to Charles M. B. Cadwalader, director of the Academy of Natural Sciences of Philadelphia, for permission to examine the type of *Notosciurus;* to J. Kenneth Doutt, of the Carnegie Museum, for giving the writer unconditional access to the specimens in his care with permission to report upon them; and to Hermano Nicéforo María, of the Instituto de La Salle, Bogotá, for the gift of valuable specimens of squirrels that are now in the United States National Museum. Deep appreciation is expressed to the members of the staff of the British Museum (Natural History) and of the Muséum National d'Histoire Naturelle, Paris, for the freedom enjoyed by the author in examining the collections of mammals in their charge.

In the lists of specimens, the following abbreviations are used:

A.M.N.H. = American Museum of Natural History.
B.M. = British Museum (Natural History).
C.M. = Carnegie Museum, Pittsburgh.
C.N.H.M. = Chicago Natural History Museum.
M.C.Z. = Museum of Comparative Zoology, Harvard University.
M.N.H.N. = Muséum National d'Histoire Naturelle, Paris.
U.S.N.M. = United States National Museum.

Most color terms mentioned in the descriptions are shown in Robert Ridgway's "Color Standards and Color Nomenclature" (43 pp., 53 pls., Washington, 1912).

SCIURUS GRANATENSIS Humboldt

The characters of the species may be said to be, roughly, those given for the "genus" *Mesosciurus* by Allen (1915, p. 212). Since the time of Allen's monograph, his *Mesosciurus* has been synonymized with *Guerlinguetus*, and this, in turn, has generally been accorded subgeneric rank. Because of the strictly limited geographical scope of this work, the description of the species in the following pages is given largely in terms of the subspecies which occur in northern Colombia and northwestern Venezuela (map, fig. 1). Wherever necessary for purposes of comparison, reference is made to the races of outlying areas.

TAXONOMIC HISTORY OF THE MEDIUM-SIZED SQUIRRELS OF COLOMBIA

The first name applied to a squirrel with a Colombian locality is *Sciurus flavus* Linnaeus. It is described on page 64 of the tenth edition of the Systema Naturae as *"luteus, apicibus pilorum albis. . . . Habitat in America."* On page 86 of the twelfth edition, Linnaeus added the habitat *"Cartagenae"* to the description. However,

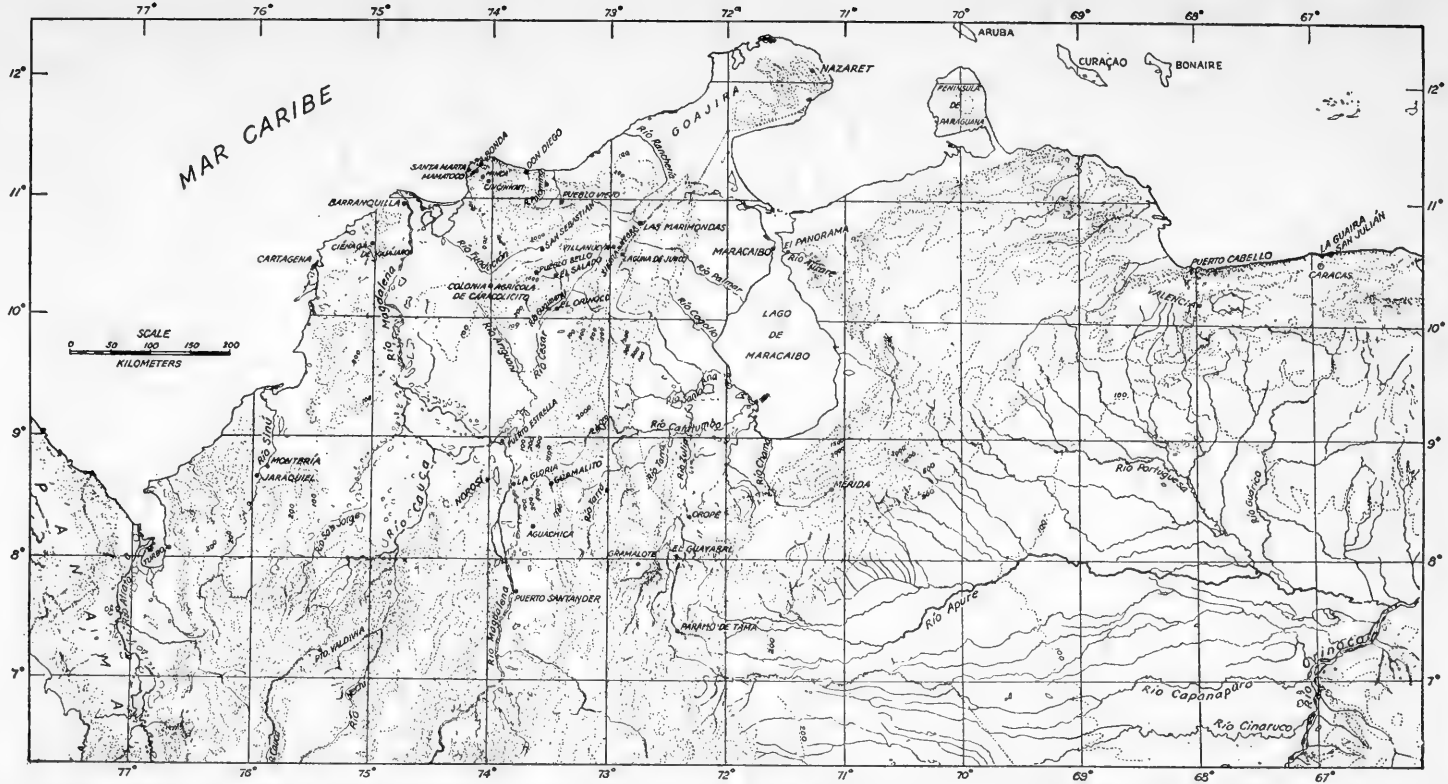

FIGURE 1.—Map of northern Colombia and western Venezuela showing collecting localities (contour intervals, 100, 200, 500, 1,500, 3,000 meters, respectively).

Pennant (1793, p. 148) believed *S. flavus* to be Indian rather than American and recorded it from the "woods near Amadabad, the capitol of Guzarat," India. Humboldt, in describing "l'écureuil orangé" from "Carthagène" as *Sciurus granatensis* (1812, p. 8, pl. 3, No. 7, figs. 1 and 2),[1] declared it to be very different from *Sciurus flavus*. The squirrels of the Cartagena region are orangeous or reddish, not yellow, and, if anything, the hairs of the back are tipped with black, never with white as in *flavus*. It seems then that *granatensis*, unequivocally from our region, is unquestionably the squirrel of the present collection and the same that has been described, subsequently, under various specific names. On the other hand, *S. flavus* Linnaeus cannot be identified with any known South American squirrel.

The next name to be applied to the squirrels of Colombia is *Sciurus variabilis*, proposed by I. Geoffroy St. Hilaire in 1832. Up to the time when Allen (1915, p. 251) formally declared *S. variabilis* to be an indeterminable species, authors generally accepted this name as the earliest for the medium-sized red squirrels of Colombia and adjacent regions. The history of *S. variabilis* is interesting. Allen, in his revision of the Neotropical Sciuridae (1915), refers to most of the literature on the subject. However, his presentation of the case, leading to the rejection of the name *variabilis*, appears to be too strongly based on his personal opinion and, we may be led to suspect, a bias favoring his own conclusions over those of other authors. The salient points of the argument may be summarized as follows:

1. The original description of *variabilis* appears to be quite adequate—indeed, much more so than the description of any other American squirrel up to the time Alston (1878) revised the group. The original series, consisting of three specimens, was collected by Plée in Colombia.

2. Alston (1878, pp. 657, 665) examined the types of *variabilis* in the Paris Museum and concluded that they represented the "oldest name and therefore the one here adopted [for the] red specimens from Colombia and strictly synonymous with Gray's *gerrardi*." Among other squirrels referred to *variabilis*, Alston included one from "Santa Martha," or Santa Marta, the old name for the province that was later combined with the province of Valledupar to form the present department of Magdalena.

3. Bangs (1898, pp. 183–186) identified squirrels from the Santa Marta region, Colombia, as *variabilis* and restricted the type locality to Bonda on the coast. He described *S. variabilis saltuensis* from the Sierra Nevada in the interior.

4. Allen (1899, p. 216), who was prepared with a name for the Bonda squirrel (*bondae*), objected to Bangs's conclusions. He did not

[1] The work consulted, a second issue of the Mémoire first published in 1805, *fide* Sherborn, Ann. Mag. Nat. Hist., ser. 7, vol. 3, p. 428, 1899.

agree that Geoffroy's description of *variabilis* fitted the Santa Marta squirrels, and he thought that the type specimens "are much more likely to have come from Western Colombia than from the coast district about Santa Marta." Accordingly, he advanced *saltuensis* to specific rank with *bondae* as a subspecies.

5. Bangs (1900, p. 91) held his ground and insisted that until it could be proved by comparison with the types that he was wrong, his identification of *variabilis* and restriction of its type locality must stand "according to all ruling."

6. Allen (1904, p. 434) summed up the arguments and felt it "safe to assume that the real type locality of *S. variabilis* is the Magdalena River of Colombia, at some point remote from the coast, in the region inhabited by *Ateles hybridus*," the type of which was also collected by Plée. Hence, he argued, *bondae*, having originated in an entirely different region, must differ from *variabilis*.

7. Allen (1914, p. 593) described *S. saltuensis magdalenae* from El Banco, Río Magdalena, at the mouth of the Cesar. This locality is within the area that Allen (1904, p. 435) had thought almost certain to be the "real type locality of *S. variabilis*." He did not return to this question, however, in the description of *magdalenae*.

8. Thomas (1928, p. 590) showed that *magdalenae* was identical with *splendidus* Gray (1842). He identified a specimen from the "Río Cesar, Santa Marta," as perfectly representative of *splendidus*, and referred *bondae* and *saltuensis* to it as subspecies.

The present author has examined in detail the types (two specimens) of *S. variabilis* in the Paris Museum. In addition, he has seen some of the specimens studied by Bangs and Allen, including the type of *bondae*, as well as a considerable amount of new material. In the light of this, the following opinions may be offered: (1) Bangs correctly identified his squirrels as *S. variabilis* (=*granatensis*), and Allen was not justified in renaming them without recourse to comparison with the types; (2) Allen's objection to the restriction of the type locality to Bonda may be sustained and his assumption of its location somewhere up the Magdalena distant from the coast appears valid.

Thus, one might revert to Alston and adopt the specific name *variabilis* were it not for the fact that *granatensis* is the older valid name for the medium-sized squirrels of Colombia. However, the contrastingly colored reddish and black squirrels from La Gloria, Río Magdalena, agree completely with the lectotype of *S. variabilis* and are sufficiently distinguishable from the nearly uniformly orange-colored *granatensis* to warrant recognition of the name *variabilis* as a subspecies. The still paler form of the Santa Marta region may retain the name *bondae*. Furthermore, the squirrels of the Río Cesar, from its head to its mouth at the Magdalena, show small but consistent differences in color from those higher up the Magdalena, at La Gloria,

and they may continue to be known as *splendidus* (*magdalenae*). Additional details concerning the above are given under the appropriate subspecies headings.

Further study of the variation and distribution of *Sciurus granatensis* reveals that other forms, previously considered distinct specifically, grade into it. These are listed and discussed separately. The status of *S. pyrrhinus* Thomas is obscure. Specimens in the United States National Museum from Chanchamayo and La Merced, Peru, agree with the description of *pyrrhinus* externally, but their cranial measurements differ widely and clearly show that they are members of the *Hadrosciurus* group. The author's notes on the type merely indicate that it is a large squirrel, probably of the *Hadrosciurus* group. This species has been considered by Allen (1915, p. 254) a form of his genus *Mesosciurus* most nearly related to *saltuensis* (=*granatensis*). Other species generally included in the "*Mesosciurus*" group are *richmondi* and *argentinus*. These are not dealt with here and may be distinct from *granatensis*.

The following additional named forms, listed and discussed in chronological order, are considered synonyms of *granatensis*. Most of these names are retained as valid subspecifically.

Sciurus chrysurus Pucheran (1845, p. 337). This is an immature of *Sciurus hyporrhodus* Gray (1867), which name it replaces as it has been described from the same locality, "Santa-Fé de Bogotá." The type matches perfectly with very small, immature representatives of *granatensis* from the Bogotá region. It has been confused by revisers with the very different *S. rufoniger* described from the same locality by the same author (1845, p. 336).

Sciurus gerrardi Gray (1861, p. 92) described from "New Grenada." The use here of the earlier name *granatensis* for the common squirrels of Colombia eliminates *gerrardi* as a species. Alston (1878, p. 666) had examined the types of both *gerrardi* and *variabilis* and declared them to be exactly synonymous. Thomas (*in* Allen, 1915, p. 240, footnote 1) concurred. By suppressing the name *variabilis*, Allen was compelled to resurrect *gerrardi* as the name for the common red squirrel. After considerable difficulty he decided (1915, p. 308) to restrict the type locality of *gerrardi* to somewhere between the range of the "*zuliae-cucutae* group" and "*baudensis*"; a specimen from the Río San Jorge was considered typical. This must be accepted, and the squirrels of that region may be known as *S. granatensis gerrardi* and distinguishable from the typical form by the redder color and the black-tipped tail, if this last is, indeed, a valid distinction.

Sciurus hoffmanni Peters (1863, p. 654). Examination of specimens from Costa Rica, Panama, Colombia, and Ecuador representing all the forms recognized by Allen (1915) as races of *hoffmanni* and comparison of these with the material which forms the principal subject of

this paper reveal no specific differences. Allen's concept of *hoffmanni*, conforms, in general, to the physical expression of the common species in the middle altitudes of the Colombian and Ecuadorian Andes. Thus, the "remarkable hiatus in distribution in northwestern Colombia and the southern part of Panama" of the typical form of *hoffmanni* that so confused Allen (1915, pp. 212, 219) and later investigators is disposed of.

The distribution of *hoffmanni* as given by Allen (1915, p. 216) is considerably embroiled. It starts in Costa Rica, skips Panama where *chiriquensis* occurs, and the lowlands of northwestern Colombia. It reappears in the Andes of Colombia but with its continuity in the Cordillera Central interrupted by *quindianus*. It is further recorded from the Andes of Ecuador and is said to continue south to Bolivia. However, the recognition of the conspecificity of *hoffmanni* and the other described species in the areas concerned, with *granatensis*, resolves the distributional anomaly into a logical, as well as natural, pattern. It may be possible to reassign most of the Colombian records given by Allen for *hoffmanni* to forms already described from there. His Ecuadorian records are assignable to either *imbaburae* or *söderströmi*. Ellerman (1940, p. 340), aware of the distributional difficulty, lists *söderströmi* as a valid race. The Bogotá form, generally known as *S. hoffmanni hyporrhodus* Gray, is replaced by *S. granatensis chrysurus* Pucheran (*q. v.*).

Macroxus griseogena Gray (1867, p. 429). Allen (1915, p. 226) listed the original citation as a "composite species," because Gray gave the habitat for *griseogena* as Honduras, Venezuela, Santa Fé de Bogotá, Mexico, Isthmus of Panama, and Volcán de Cartago in Costa Rica. This range does not appear to be too exaggerated, when it is recalled that this form has been considered at various times identical with *hoffmanni* by authors. Even Allen (1915, pp. 212, 224, 228) showed that intergradation took place between the two animals, but he kept the names apart. Thomas (1901, p. 193) fixed the type locality as Venezuela. It is here further restricted to San Julián on the basis of the specimens from this locality recorded by Robinson and Lyon and which are at hand. These authors submitted specimens to Thomas for comparison and they (1901, p. 144) recorded his opinion as follows: "'The squirrel is very typical of *S. griseogena* Gray, the specimen No. 102721, being more exactly like the type than any others of the large numbers we have here [in the British Museum].'" Further treatment of *griseogena* is given later on in the text where it is demonstrated that it grades into *granatensis* of Colombia.

Sciurus chapmani Allen (1899, p. 16). Described from the island of Trinidad. This squirrel is an extremely small representative of the common species. It is indistinguishable from the squirrels of Cristóbal Colón at the tip of the París Peninsula on the Venezuelan

coast opposite the northwestern tip of Trinidad. The range of this form continues west across the arid coast and grades into the slightly larger and darker *griseogena*.

Sciurus (*Guerlinguetus*) *quebradensis* Allen (1899, p. 217). Described from Quebrada Seca, east of Cariaco, at the southern base of the Peninsula de Araya, in northern Venezuela. Allen (1915, p. 230) has already treated *quebradensis* as a synonym of *chapmani*. This is rather surprising in view of that author's tendency to split subspecies into genera and subgenera. The locality records of *quebradensis* are of interest. They are evidence of the continuity of the range of the species *granatensis* across the northern coast of Venezuela into Trinidad and indicate that the ranges of *chapmani* and *griseogena* may be contiguous.

Sciurus nesaeus G. M. Allen (1902, p. 93). A topotype at hand from Margarita Island suggests that this squirrel, like *chapmani*, is an insular offshoot of the common species. It appears to have differentiated more from the mainland stock than has *chapmani*. It may be an arbitrary procedure to regard *nesaeus* as a subspecies of *granatensis*, but in the absence of evidence to the contrary its relationship to the continental form is thus best expressed. Allen (1915, p. 233) spoke of *nesaeus* as being "intermediate between its two mainland neighbors, *M. griseogena* and *M. chapmani*."

Sciurus tobagensis Osgood (1910, p. 27). From the island of Tobago, northeast of Trinidad. This form has been considered a race of *chapmani* (=*granatensis*) by Allen (1915, p. 232). Three topotypes at hand confirm its near relationship to *chapmani* as well as its specific identity with *granatensis*. The squirrels of the islands of Trinidad, Margarita, and Tobago are all very closely related and all are *griseogena*-like in appearance. The differences which separate them from each other and from the mainland *griseogena* are nowhere as great as the differences between the coastal Colombian and Ecuadorian forms and their high Andean relatives.

Notosciurus rhoadsi Allen (1914, p. 585, fig. 1). The genotype, and only specimen, is an immature individual of "*hoffmanni*" with the furred portions of the ankles left tucked over the soles of the hind feet through carelessness by the preparator. This condition was described and figured by Allen as the principal generic character. The specimen was brought from the Pagma Forest, Ecuador, by Samuel N. Rhoads and first recorded by Stone (1914, p. 14) as *Sciurus irroratus* Gray. It is quite obviously the same as the other Rhoads squirrels from Mount Pichincha, Ecuador, which Stone described as *Sciurus hoffmanni söderströmi*.

Guerlinguetus griseimembra Allen (1914, p. 589). Examination of the original series, including the type, shows that this small highland

form (like *meridensis*, *q. v.*) grades into the larger *granatensis* of the lowlands through geographically intermediate series.

Guerlingeutus candalensis Allen (1914, p. 590). This form is too slightly distinguished from *griseimembra* to warrant its ever being separated from it specifically.

There is appended to this paper a supplementary list of the South American forms of *granatensis* that may be recognized.

COLOR PATTERNS AND INDIVIDUAL VARIATION (TABLE 1)

Among the individuals of the species herein described there are four basic color patterns apparent on the back and sides:

(1) A more or less uniformly reddish[2] color phase.
(2) A more or less uniformly orangeous[2] color phase.
(3) An agouti pattern. Results from a mixture of annulations of reddish or orangeous with black on the individual hairs.
  (a) Pale agouti—with the reddish or orangeous predominating; many of the hairs may lack black bands.
  (b) Dark agouti—with the black predominating; many of the hairs may be entirely black.
(4) Contrasting patterns.
  (a) With either reddish or orangeous on anterior portion of the back and the agouti on posterior portion (and base of tail).
  (b) As in (a) but with black instead of agouti on rump (and base of tail).
  (c) As in (a) or (b) but with the agouti, or black, of rump extending anteriorly for varying lengths as a median dorsal band and sometimes even passing forward onto the crown as a cap; the reddish or orangeous of sides, and especially the shoulder regions, are contrastingly defined. The resulting pattern may be designated as either 4ab (contrasted with agouti) or 4ac (contrasted with black).

Most individuals conform closely to one of the above patterns. Some specimens show a combination of two or more of these patterns either in the form of some distinct design or some irregular markings or mottling, while the pattern of others may lie somewhere between two of the basic categories. In practically all populations, however, one or two closely intergrading patterns dominate and the series may be classified accordingly (table 1, p. 34).

The individual hairs of the back and sides may be unicolor to the roots or with gray bases, or they may be ringed with from two to five color bands. Underparts vary from entirely white on belly, chest, neck, throat, forelegs, and thighs to entirely orangeous or reddish. Tail, on upper surface, may be uniformly orangeous or reddish throughout its length or with basal portion agouti or black; the tip or terminal portion may be slightly darker than the bright middle portion, to entirely black; ventral side of tail may be uniformly

[2] As used herein, "reddish" covers the red-yellow tones shown in Ridgway, where the red appears to be dominant, and "orangeous" where the yellow appears dominant.

colored or may be banded longitudinally in some regular pattern giving a bicolor, tricolor, or quadricolor effect, or it may be irregularly banded, or simply show a mixture of differently colored hairs; individual hairs of tail may be unicolor or show from two to ten bands of color.

No truly melanistic individuals are included among the squirrels described under the subspecies headings. In *Sciurus granatensis chrysurus* of Bogotá a more or less blackish phase appears, with a melanistic individual noted.

MOLT AND SEASONAL CHANGE

Judged from the appearance of individuals in various stages of molt, it appears that the colors and patterns of the new pelage of one season are not necessarily faithful reproductions of those of the corresponding season of the previous year. It seems that the amount of white or red on the ventral surface will vary from season to season in any one representative of a group where both red and white undersides occur; that the color and pattern of an individual may shift from one of the categories listed above to another one if both colors and patterns occur in the population; that an individual with a uniformly colored tail one season may have a black-tipped or distinctly bicolor one the next, provided such variation exists in the group to which it belongs. Such changes appear to represent phases of a long and complex cycle correlated with the physiological changes attending growth, breeding, and senescence, and with the individual or group response to environmental fluctuations.

Such morphological changes are known to occur among mammals of the temperate zones and have been consistently studied. At present the determination of seasonal changes in pelage and color pattern in any species of tropical-zone mammal is difficult and in most cases practically impossible. Nearly all specimens of tropical American mammals in our collections represent small series taken within a very short period of time. Where we do find a large series taken during a period of time covering two or more calendar seasons, we may find also that the locality given on the labels of the specimens represents, in reality, an immense area that harbors a number of diverse populations. Each of these populations, in turn, may be subjected to a different ecological season within the same calendar period.

Among the squirrels of the present collection under study, only one series, that taken from the middle Río Cesar region, lends itself as most nearly suitable for throwing some light upon the question at hand. This series of 66 specimens includes 27 from the Río Guaimaral, a channel of the Cesar, and 39 specimens from El Orinoco, Río Cesar. The names of the localities represent different camps about 5 kilometers apart in the same general area. The squirrels were taken within a radius of 5 kilometers from each camp.

The material from the two stations was collected as follows:

Guaimaral	27 specimens	Aug. 20–Sept. 28, 1942.
Cesar	30 specimens	Oct. 3–Nov. 2, 1942.
Cesar	9 specimens	Mar. 31–April 9, 1943.

In comparing the first 2 groups, which were taken during a continuous period, most apparent is the fact that the second group averages darker (reddish) than the first (orangeous). A comparison of the first 10 adults taken at Guaimaral (August 20–24) with 10 adults taken at Cesar in practically the same length of time 2 months later (October 21–24) reveals the following differences:

Guaimaral: Pelage thin and, in seven specimens, very worn. Nine specimens distinctly mottled orangeous and reddish; the tenth, in old worn pelage, uniformly reddish. No distinct molt line evident.

Cesar: Pelage thick and, in most cases, new throughout the body of each individual. Mottling subdued, the color nearly uniformly reddish in seven specimens, orangeous in two, and mottled orangeous and reddish in one.

The specimens taken during the intervening time show, in general, the following succession:

(1) A mixture of new orangeous and old reddish pelage; and old reddish pelage giving way to new orangeous pelage; molt line present (to September 6).

(2) New orangeous pelage becoming reddish (to October 12).

(3) Prime red pelage with a few individuals in new orangeous pelage (to November 2).

The third and last group taken from the Cesar (9 specimens, March 31–April 9) confirms the above succession of an actual change in color phase. This group agrees with the Guaimaral series in being paler than the other Cesar group. It shows the reddish pelage old and worn being replaced by a new orangeous pelage.

In connection with the author's observations on the rainfall at these collecting stations, the following conclusions may be drawn: During the height of the rainy season (October and November) the pelage is prime, reddish. In the ensuing dry season (December–April [May and June]), the pelage becomes old and begins to be replaced by a new orangeous one. The condition during the rainy season which follows (to August) is not known but, judged from what follows, the new orangeous becomes prime reddish. During the short dry season, or "veranillo" (August, September), the reddish begins to molt and is replaced by new orangeous, which in turn, when the rainy season is resumed (September), becomes prime reddish again. To this may be added that the color of the tail appears to undergo the same changes but lags, in time, behind those of the rest of the body.

The mottled condition, so often referred to here and in succeeding pages, may either result from the *molt* of reddish- to orangeous-colored pelage, or the *change* in color from orangeous to reddish, or it may be a characteristic of the individual color pattern quite independent of the first two factors.

Extreme caution must be exercised in attempting to apply the findings from the study of the squirrels of the middle Río Cesar to those of other regions. The Cesar series represents a fairly homogeneous group with the variation in color restricted to the conditions between uniformly reddish and uniformly orangeous. The squirrels taken at three different stations in the Sierra Nevada de Santa Marta show a variety of color patterns and combinations of patterns but do not supply clues that may lead one to suspect that their differences in pelages, color phases, and color patterns are related to changes in the environment of any one of the localities. The three series are listed with the pertinent data:

Colonia Agrícola. Altitude 335 meters above sea level. 17 specimens from January 15 to March 2, 1942. Period rainy with a few clear days. All conditions of color, pattern, and pelage as noted for the subspecies *agricolae.*

Pueblo Bello. Altitude 1,067 meters. 17 specimens from April 24 to May 17, 1942. Period very rainy. All conditions of color, pattern, and pelage as noted for the subspecies *saltuensis.*

El Salado. Altitude 430 meters. 19 specimens from June 23 to July 21, 1942. Dry period with occasional rains. Agree with the Colonia Agrícola series of *agricolae* and show an even wider range of variation.

SCIURUS GRANATENSIS GRANATENSIS Humboldt

Sciurus granatensis Humboldt, Recueil d'observations de zoologie et d'anatomie comparée, vol. 1, p. 8, pl. 3, No. 7, 1811 (1812); *ibid.*, vol. 1, livr. 1, 1805, first issue, *fide* Sherborn, Ann. Mag Nat. Hist., ser 7, vol. 3, p. 428, 1899.

Type.—No type specimen preserved. Name based on description of the squirrels observed and the original figures (*op. cit.*) of tongue, larynx, and hyoid bone of an individual dissected in the field.

Type locality.—Cartagena, Department of Bolívar, Colombia.

Distribution.—Department of Atlántico, and Province of Cartagena, northwest Bolívar Department, Colombia.

Characters.—Upperparts orangeous, underparts sharply defined white. Paler than *splendidus* and *gerrardi;* slightly smaller and more red than *bondae;* more uniformly orangeous than *morulus* and *salaquensis.*

Coloration.—The series of six males and eight females from Ciénaga de Guájaro, 53 kilometers northeast of Cartagena, are considered typical. In most individuals of this series the entire surface of the dorsum ranges from nearly uniformly orange to orange-rufous, and mars orange in the darkest specimens; hairs orange with or without fine black tips, becoming paler toward the gray bases. In two specimens lower back mixed orange and black. Sides of body and limbs like back or more yellow, and without black; chin and sides of face paler than sides; crown like back; nape like crown or slightly darker and contrasting with crown and back. Tail with basal portion faintly mixed with black to nearly entirely black, tip like middle

orange portion of tail, or from slightly darker to entirely black; undersurface of tail may be uniformly colored, bicolor or tricolor with black forming the middle band.

The two specimens with the contrastingly dark rumps and black-tipped tails mentioned above stand out sharply from the other members of the series. These show a color pattern, recalling that of the figure of the type of *gerrardi*.

Measurements.—See table 2.

Remarks.—The section containing the original references to *Sciurus granatensis*, nearly lost in Humboldt's "Memoire sur l'Os Hyoïde et le Larynx des Oiseaux, des Singes et du Crocodile," is here quoted in full:

> Ayant vécu pendant plusieurs années presque constamment à l'air libre, et entouré d'animaux exotiques, j'ai été étonné de la perfection avec laquelle quelques mammifères imitent la voix des oiseaux: c'est le cas de quelques écureuils et des petits singe sapajous. En ouvrant le larynx de ces animaux, j'ai été frappé de l'analogie qu'ils présentent avec ce que M. Cuvier a découvert dans le larynx inférieur des oiseaux. Que l'on compare dans mes dessins l'organe de la voix du *pelecanus olivaceus* avec celui du petit titi du Darien (*Simia oedipus* de Brisson) et avec celui de l'écureuil de Carthagène, qui est très-différent du *Sciurus flavus*, et qui approche assez du *sciurus erythraeus* de Pallas: on pourroit confondre le larynx du petit singe siffleur avec celui de l'écureuil orangé, et les même poches (pl. 3, Nos. 7, 8) que l'oiseaux cache dans son larynx inférieur, se trouvent dans le larynx supérieur de ces mammifères.

Sciurus granatensis does not emit a birdlike call. What Humboldt must have had in mind is the quickly repeated clucking sound the squirrel makes when "scolding" or "chattering."

Specimens examined.—Ciénaga de Guájaro, 14 (U.S.N.M.).

SCIURUS GRANATENSIS BONDAE Allen

Sciurus variabilis variabilis, Bangs, Proc. Biol. Soc. Washington, vol. 12, pp. 184, 186, 1898 (*nec* Geoffroy); Proc. New England Zool. Club, vol. 1, p. 91, 1900.

Sciurus saltuensis bondae Allen, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 213, 1899; vol. 20, p. 432, 1904.

[*Sciurus splendidus*] *bondae*, Thomas, Ann. Mag. Nat. Hist., ser. 10, vol. 2, p. 590, 1928.

Holotype.—Adult female, skin and skull, A.M.N.H. No. 152334; collected July 1899, by Herbert H. Smith.

Type locality.—Bonda, at the base of the northwestern corner of the Sierra Nevada de Santa Marta, Colombia; altitude about 50 meters.

Distribution.—Base and lower levels of the northwestern slope of the Sierra Nevada de Santa Marta.

Characters.—Palest of the Sierra Nevada de Santa Marta squirrels; paler than *granatensis;* larger than *saltuensis.*

Coloration.—The original description is lengthy and quite adequate, especially in pointing out the variations in color. Exception is taken,

however, to the interpretation of these variations. Allen (1899, p. 213) described these mainly in terms of a "winter or breeding pelage" and a "summer or postbreeding pelage," yet the specimens upon which these descriptions could be based clearly include all the 36 specimens taken during July (*op. cit.*, p. 214). Ten topotypes that Allen originally described as being in the "annulated olivaceous phase" and possibly corresponding to the "summer or post-breeding pelage" were taken on the following dates: January 5, February 5, March 25, March 27, June 22, July 3, 13, 19, 20, and one without date. These specimens are now in the collection of the United States National Museum; they represent a fairly uniformly colored series. They are redescribed as follows:

Back capucine yellow or xanthine orange to orange-rufous more or less ticked with black. In some specimens the hairs of the whole dorsum are tipped or annulated with black (pale agouti, pattern 3a), in others only the hairs of the posterior half of the back are conspicuously tipped and annulated with black (pattern 4a) and still others with the grizzled rump and median dorsal band contrasting with the clearer orange of the shoulders (pattern 4ac). Except for the white ventral portions, forelegs nearly uniformly orange to xanthine orange, the hind legs like rump or nearly uniformly orange. Sides of body like back but with an orange lateral line sharply defining the white underparts. Upper surface of tail xanthine to mars orange, beneath faintly bicolor to distinctly so, or weakly tricolor with black forming the middle band.

Remarks.—Additional specimens examined, taken at Bonda, Minca, Mamotoco, and Cincinnati during January, June, July, and August, agree with the above description except for two adults and one immature collected by Carriker at Cincinnati and Minca, respectively, which agree with *saltuensis* in color. Allen (1904, p. 431) quoted H. H. Smith, who collected the type series as well as specimens identified as *saltuensis*, as follows:

"Common, ranging from sea-level to 6,000 feet or higher. As shown by Dr. Allen (this Bulletin, XII, 1899, pp. 214–216) the color of the upper parts varies from red, more or less bright, to dark olivaceous; he considers the former a breeding and the latter a summer or postbreeding pelage. My strong impression however, is that the depth of coloring is connected in some way with the habitat. We observed that specimens shot near sea level (*Sciurus saltuensis bondae*) were generally red, no matter in what month they were found; while those from the mountains (*Sciurus saltuensis*) were commonly dark at all seasons; the rule, however, is not invariable, as we have some dark ones from near the coast and a few bright red ones from the higher mountains. At Minca (2,000 feet) the two varieties were about equally common in May. It may be well to note that our first collections were from Bonda, and nearly all the squirrels were red; as dark ones were brought in we noted the difference and always saved such specimens if we could, while often rejecting the red ones. Consequently, the collection does not give a correct idea of their relative abundance.—H. H. S."

Specimens examined.—Thirty. Bonda, 16 (5, including type, A.M.N.H.; 10, U.S.N.M.; 1, C.M.); Minca, 7 (C.M.); Cincinnati, 5 (C.M.); Mamatoco, 1 (C.M.); "Santa Marta Mts.," 1 (U.S.N.M.).

SCIURUS GRANATENSIS SALTUENSIS Bangs

Sciurus variabilis saltuensis Bangs, Proc. Biol. Soc. Washington, vol. 12, p. 185, 1898.

Sciurus saltuensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 431, 1904.

Mesosciurus saltuensis saltuensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 34, p. 247, 1915.

[*Sciurus splendidus*] *saltuensis* Thomas, Ann. Mag. Nat. Hist., ser. 10, vol. 2, p. 590, 1928.

Holotype.—Adult female, skin and skull, M.C.Z. No. 8144; collected March 26, 1898, by W. W. Brown, Jr.

Type locality.—Pueblo Viejo, Río San Antonio, northern slope of the Sierra Nevada de Santa Marta, Magdalena, Colombia; altitude 853 meters.

Distribution.—From near sea level to approximately 2,000 meters on the northern base and slopes of the Sierra Nevada de Santa Marta, south through the mountains to the southern slopes at altitudes ranging between 1,000 and 2,000 meters. The type locality, on the northern slopes of the mountains, is situated at an altitude considerably less than the 8,000 feet given for it by Brown and cited by Bangs in the original description.

Characters.—Darkest and smallest of the Sierra Nevada de Santa Marta squirrels, with thicker and longer pelage.

Coloration.—The subspecies has been well described by Bangs and by Allen. The specimens described below were taken on the southern slopes of the mountains.

Pueblo Bello (9 males and 8 females): The series shows a continuous gradation between *saltuensis* and *agricolae* (*nomen novum*) from the type locality and from El Salado. It ranges from four specimens more or less uniformly mars orange (except for white ventral parts) with a very light ticking of black on the back, through individuals with increasing amounts of black, to one uniformly dark agouti with a heavy black median dorsal band and black fore and hind feet. The intermediate agouti individuals with contrasting shoulder regions exhibit a bright reddish lateral line. With the increasing amount of black on the dorsum, some of the hairs become entirely black while the contrasting color of the annulated hairs becomes increasingly yellower. The tails are fairly uniformly orangeous or reddish above, except for the basal portions which agree with the rumps; beneath they range from uniformly colored to bicolor and tricolor.

Remarks.—Two specimens of *saltuensis* from Cincinnati and Don Diego (collected by Carriker) show the color of *saltuensis* with the

short, stiffer pelage of *bondae*. Five other Cincinnati specimens of the same series have been assigned to *bondae*. The region in question is one where intergradation between the two races may be expected. In the eastern, higher parts of Cincinnati, *saltuensis* should occur while the lower, western part, is the habitat of *bondae*. The appearance of both reddish and dark agouti individuals of *saltuensis* near the coast (see *bondae, antea* p. 13) is duplicated in Pueblo Bello, which is well in the interior of the mountains and distant from the coast. However, the tendency in the Sierra Nevada is for the squirrels to become agouti and progressively darker with the increase in altitude. The squirrels seen above 2,000 meters altitude in the vicinity of San Sebastián are blackish. Of the four more or less uniformly reddish specimens of the Pueblo Bello series described above, two are immature, one is subadult.

Specimens examined.—Twenty-four. Pueblo Viejo, 2 (C.M.); Minca, 1 (C.M.); Cincinnati, 2 (C.M.); Don Diego, 1 (C.M.); Palomino, 1 (U.S.N.M.); Pueblo Bello, 17 (U.S.N.M.).

SCIURUS GRANATENSIS AGRICOLAE, new subspecies

Holotype.—Adult male, skin and skull, U.S.N.M. No. 279775; collected March 1, 1942, by Philip Hershkovitz; original No. 208.

Type locality.—Colonia Agrícola de Caracolicito, Río Ariguaní, on the southern slopes of the Sierra Nevada de Santa Marta, Department of Magdalena, Colombia; altitude 335 meters.

Distribution.—Southern and eastern slopes of the Sierra Nevada de Santa Marta at altitudes ranging between 200 and 1,000 meters.

Characters.—Size as in *bondae* but darker, redder; larger, paler, with less black than *saltuensis;* smaller, less uniformly colored, more agouti, than *splendidus*.

Coloration of holotype.—Back and crown mars orange lightly ticked with black; hairs tipped black, broadly banded mars orange subterminally and becoming paler, yellower toward the gray bases. Sides of body, neck, fore and hind limbs, except for white ventral portions, mars orange, the hairs becoming paler toward the base. Sides of face, rostrum, chin, ochraceous-buff ticked with black, more tawny beneath the eyes. Underparts white as usual. Tail above burnt sienna, beneath weakly defined tricolor, the hairs yellowish basally, black medially, burnt sienna terminally.

Measurements of holotype (in millimeters).—Head and body, 238; tail, 240; hind foot, 60; ear, 30; condylobasal length, 51.6; zygomatic breadth, 32.5 (approximate); length of nasals, 17.0; interorbital constriction, 18.7; postorbital width, 18.7; width of braincase, 23.9; alveolar length of molar row, 10.0.

Coloration of the paratopotypes (9 males, 7 females).—The series exhibits the two dominant color phases in many forms; some specimens

are mottled with the orangeous and reddish colors, others are either reddish or orangeous with hairs of rump, nape, and crown annulated with black (4a, see p. 9), still others with the annulated hairs of rump extending forward as a weak median dorsal band (4ac). Basal portion of tails like rump, remainder, on upper surface, orange-chrome or orange-rufous to mars orange; hairs of undersurface with lighter basal portions comparatively narrow and sometimes with narrow black subterminal bands. Underparts as usual but one specimen with the white of the thighs produced downward as a line for the entire length of the foreleg and continued as a white fringe on the outer side of the foot; the feet themselves are haired white on the dorsal surface for half their distal length; the soles, except for a narrow inner portion, are unpigmented.

El Salado (10 males, 10 females): In the main, agree with the above but show greater extremes of variability. Here the tendency is to throw into sharper relief the combinations of the two color phases and of the various color patterns. Some of the specimens are quite like the topotypes, others merge into the series of *saltuensis* from Pueblo Bello, and others agree with *splendidus* from the middle Río Cesar. In one specimen, the tail, on the ventral surface, is broadly bicolor; the tails of two others whose body colors conform roughly to pattern 4ac (p. 9) are distinctly tricolor.

Remarks.—Gradation between such extremes as the large red squirrel of the Cesar (*splendidus*) and the smaller blackish one of the Sierra Nevada (*saltuensis*) is clearly demonstrated by the geographically intermediate *agricolae*.

Specimens examined.—Thirty-seven. Colonia Agrícola de Caracolicito, 17 (U.S.N.M.); El Salado, 20 (U.S.N.M.).

SCIURUS GRANATENSIS SPLENDIDUS Gray

Sciurus splendidus Gray, Ann. Mag. Nat. Hist., vol. 10, p. 263, 1842.

Sciurus saltuensis magdalenae Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 593, 1914 (El Banco, Río Magdalena).

Mesosciurus saltuensis magdalenae Allen, Bull. Amer. Mus. Nat. Hist., vol. 34, p. 251, 1915.

Sciurus splendidus, Thomas, Ann. Mag. Nat. Hist., ser. 10, vol. 2, p. 590, 1928 (*S. saltuensis magdalenae*=*S. splendidus* Gray).

Holotype.—Specimen of unknown sex and habitat, from the collection of the Museum of the Earl of Derby and now preserved in the Liverpool Free Public Museum.

Type locality.—Unknown. Here fixed on the banks of the Río Cesar near its confluence with the Magdalena. Determination based on the identification by Thomas of a squirrel from the Río Cesar "as perfectly representative of [*splendidus*]," and on considerable other material from the Cesar Valley.

Distribution.—The valley of the Río Cesar, possibly extending northward to the Guajira Peninsula and the lowlands on the east side of the Río Magdalena from its junction with the Cesar, downstream possibly to its mouth.

Characters.—More or less uniformly colored reddish or orangeous on back and sides, underparts white; darker than *granatensis;* paler than *variabilis,* without the heavy suffusion of black on back, the tail fairly uniformly colored. Size as in *variabilis;* larger than *granatensis.*

Coloration.—Each of the series assigned to *splendidus* is described under the heading of its locality.

Puerto Estrella (3 specimens): Pelage thin, hairs comparatively short and stiff; back, sides, and tail, mars orange with a slight mottling of burnt sienna, the hairs without black tips or annulations; sides of face xanthine orange; underparts white as in *granatensis.* The series is practically topotypical of both *splendidus* and *magdalenae.*

Middle Río Cesar (36 males and 30 females, from El Orinoco and Río Guaimaral): Back orange-rufous to mars orange and burnt sienna with hairs less red toward their bases and with or without fine black tips. Crown, ears, sides of body and neck, throat, fore and hind limbs on outer sides like back. Tail generally like back, the hairs orange at base, redder terminally, sometimes a dark subterminal band on hairs of distal one-fifth to one-half of tail. Rostrum, cheeks, and chin orange to xanthine orange. Belly, chest, and ventral surface of neck sharply defined white; inner sides of upper arms and hind legs to varying lengths white, remainder of limbs like sides. The Río Guaimaral series, on the whole, averages slightly paler than the El Orinoco series.

Two color phases are represented here: the lighter one is orange-rufus; the darker, mars orange (or like burnt sienna if the fine black tips of the hairs are taken into account). Some individuals are uniformly of one color or the other; other specimens may be irregularly mottled with both colors or, as in one specimen, the paler anterior half of the back is separated from the darker posterior half by a molt line. In a few specimens there is an indication of a fine dark ticking, or agouti, on the rump. Occasionally, spots of orange appear on the white of the undersurface. There may be a few white hairs interspersed over the back. The tendency toward a tricolor pattern on the underside of the tail is very weak. In the majority of individuals even a bicolor effect is nearly suppressed, owing to the very short paler basal portions of the hairs.

Villanueva (3 males, 2 females): Back, sides, crown, and limbs except for white ventral portions, xanthine orange mottled or mixed with mars orange; one specimen with large irregular patches of mars orange. Tail, above and below, fairly uniformly orange-rufous or mars orange but with slightly darker tips in two specimens. Sides

of face and upper part of throat with more yellow. Underparts with the usual white pattern.

NAZARET (1 male): A single specimen, without skull, taken in May 1941 by Wetmore and Carriker, is slightly paler than the palest of the Villanueva series. It may represent an isolated race at the tip of the Guajira Peninsula, or simply the continuation of the tendency of *splendidus* to become paler from south to north.

Remarks.—This subspecies is characterized by a greater uniformity in color and pattern over a greater number of specimens than any of the other forms considered here. The race shows a marked color gradient following geographical lines. From the reddish phase found at the mouth of the Cesar the animal becomes progressively paler upstream. In the middle Cesar both the reddish and the orangeous phases appear. Farther upstream, at the head of the river, the squirrels show both the reddish and orangeous phases but in paler tones than those lower down. Finally the orangeous individual from the tip of the Guajira Peninsula is the palest of all.

A description of the seasonal change in pelage and color in the Middle Cesar series has been given under another heading.

Specimens examined.—Seventy-five: Puerto Estrella, 3 (U.S.N.M.); El Orinoco, Río Cesar, 39 (U.S.N.M.); Río Guaimaral, Río Cesar, 27 (U.S.N.M.); Villanueva, 5 (U.S.N.M.); Nazaret, 1 (U.S.N.M.).

SCIURUS GRANATENSIS VARIABILIS I. Geoffroy

Sciurus variabilis I. GEOFFROY, Mag. Zool., Paris, vol. 2, Cl. 1, pl. 4, 1832.

(For complete synonymies see text references and Allen, 1915.)

Lectotype.—Adult male, M.N.H.N. No. 534 (No. 307 in type catalog); collected by Plée in 1826.

Type locality.—Originally said to be either the Antilles, the United States, or Colombia. The wooden stand upon which the type is mounted bears the legend "Colombie." Here restricted to La Gloria, right bank of the Río Magdalena about 45 kilometers above the mouth of the Cesar; altitude approximately 45 meters.

Distribution.—In the Department of Magdalena, the Río Magdalena Valley between the bases of the Cordilleras Oriental and Central, from La Gloria south.

Characters.—Larger, darker, with more black on dorsum than *granatensis;* contrastingly colored black and reddish, underparts sharply defined white, basal portion of tail black, terminally reddish above, mixed black and red beneath, tip reddish.

Measurements.—See table 2, page 38.

Coloration.—The colored figure of the type of *variabilis* shows poor draftsmanship and an unhappy selection and combination of colors. Nevertheless, this figure, together with the original description, can

leave no doubt as to the identity of this squirrel. The actual type agrees so well with the specimens from La Gloria as to make it seem that it had originally been taken in the same area. Thus, Allen's surmise (1904, p. 434) regarding the probable habitat of *variabilis* appears to be confirmed.

In the Paris Museum there are but two specimens of the three types described by Geoffroy. Both are mounted on wooden stands and are listed by Rode (1943, p. 382) in his catalog of the types of mammals in the Paris Museum. The cotype, a female, is paler and lacks the black along the back and on the thighs noted in the lectotype. Unless this difference is a result of fading it is possible that this specimen was taken at a stopping point, along the Magdalena, other than where the lectotype was discovered. It is questionably identified with *variabilis*. The following description of the series of three specimens from La Gloria is completely representative of the lectotype:

La Gloria (2 females, 1 male): Dorsal surface from crown to basal fourth of tail, mars orange to burnt sienna mixed with black; gray crinkly bases of hairs of anterior half of back followed by a broad band of black, a narrower band of mars orange, tips black; posterior half of back with more black, the hairs entirely black or with one or two narrow orange rings between broad black bands; in one of the females rump and basal fourth of tail appear entirely black. Sides of body and limbs with less black than upper parts, especially at tips of hairs. White underparts sharply defined by a lateral line of mars orange; white of ventrum extends along inner side of forelimbs to elbows and on inner sides of thighs. Tail above orange-rufous to mars orange, the basal fourth nearly entirely black; undersurface mixed orange and black basally in all specimens, terminally nearly uniformly orange in the male, mixed black and orange in one of the females, and bicolor, the hairs with paler basal portions, in the other female.

Aguachica (2 females): Like the specimens from La Gloria. Median dorsal band wide on posterior half and extends over crown and proximal one-third of tail; lateral line distinct; fore and hind feet reddish.

Remarks.—Some knowledge of the itinerary of Plée would be of considerable interest. We know little of his explorations in tropical America beyond the reference to his name as the collector of certain animals. As it had already been generally conceded by authors (see Allen, 1904, p. 435) that the squirrel in question, as well as *Ateles hybridus*, was collected by Plée somewhere along the Río Magdalena, the writer attempted to secure examples of these during the course of his field work in northern Colombia. Representatives of *Ateles hybridus* were taken at four localities. Kellogg and Goldman, in their revision of the spider monkeys (1944, p. 25), found that the animal

from La Gloria, Río Magdalena, "appears to be typical." As is shown, the squirrels taken at the same locality are typical. Those taken on the opposite side of the river at the northern base of the Cordillera Central are quite distinct and on the basis of the original description and figure could not be identified with *variabilis*. The squirrels from a short distance lower down the Magdalena, at the mouth of the Cesar, also differ, though to a lesser degree, from the original description as well as from the typical specimens. They are uniformly reddish, lacking the black on the back and tail. Those from near the mouth of the Magdalena (Ciénaga de Guájaro) are typical *granatensis* and even paler than the Río Cesar squirrels.

On the basis of present material it appears that *variabilis* has closer affinities with the squirrels of the Cordillera Oriental than with those of the lowlands farther down the Magdalena. The series of *tarrae* (*nomen novum*) from Guamalito in the Cordillera Oriental east of La Gloria are intermediate in all characters between *variabilis* and topotypes of *tarrae* described from the opposite side of the range. Higher up the right bank of the Magdalena, in the Department of Santander, *variabilis* gives way to squirrels with red bellies and black-tipped tails, quite characteristic of *zuliae*.

Specimens examined.—Seven. Lectotype and cotype (M.N.H.N.); La Gloria, 3 (U.S.N.M.); Aguachica, 2 (C.M.).

SCIURUS GRANATENSIS NOROSIENSIS, new subspecies

Holotype.—Adult male, skin and skull, U.S.N.M. No. 279949; collected June 26, 1943, by Philip Hershkovitz; original No. 2150.

Type locality.—Norosí, Mompós, Department of Bolívar, Colombia; altitude 120 meters.

Distribution.—In the Department of Bolívar, the base and lower eastern slopes of the Cordillera Central to the west bank of the Río Magdalena.

Characters.—Bright agouti, with relatively weakly contrasting shoulder regions, underparts reddish; upper parts paler, with less black, and underparts redder, than *zuliae* and *chrysurus*.

Coloration of holotype.—Dorsal surface orange-rufous to ochraceous-orange evenly mixed with black; sides of body, shoulder regions, dorsal surfaces of upper arms and thighs with less black. Crown and nape like lower part of back; cheeks, lips, chin ochraceous, orbital ring well-defined orange. Underparts and fore and hind feet orange-rufous to mars orange. Tail above, except for mixed buffy and black basal portion, orange with black of undersurface showing through, beneath tricolor with orange on outer border, black in the middle and mixed black, orange, and buff on inner border.

Measurements of holotype (in millimeters).—Head and body, 245; tail, 233; hind foot, 62; ear, 28; condylobasal length, 52.9; zygomatic breadth, 33.9; length of nasals, 18.5; supraorbital constriction, 18.5; postorbital width, 18.5; width of braincase, 22.6; alveolar length of molar row, 9.1.

Coloration of the paratopotypes (4 males, 5 females).—All individuals of the series agree rather closely with holotype; general pattern of the pale agouti type (3a) with comparatively weak contrast in shoulder regions. Three specimens have a narrow, faintly outlined median dorsal band on lower half of back. Tails reddish on upper surface with the black hairs from beneath tending to show through; patterns on undersides of tails, bicolor, tricolor, and in one specimen, quadricolor. In latter, disposition of colors from outer border to midline is reddish, black, ochraceous, mixed black and ochraceous; individual hairs of middle portion of tail 10-banded, the buffy band at base succeeded by 4 bands of black, each of which alternates with each of 4 bands which become successively redder toward the finely pointed black tip. Underparts uniformly reddish.

Río San Pedro (6 males, 4 females): Agree generally, with the type series but average darker due to the greater tendency toward forming a dark median dorsal band. In each of two individuals there is a small narrow patch of white on the chest.

Remarks.—The type locality of the "*hoffmanni*"-like *norosiensis* is but a few kilometers from those of *splendidus* and *variabilis*, both on the opposite side of the Río Magdalena. Nevertheless, *norosiensis* is sharply distinguished from those other two races. Apparently the lower Magdalena is a complete barrier to intergradation between the squirrels of the opposing banks. To show gradation from *norosiensis* to *variabilis* it is necessary to pursue a path along the Central Andes to the upper Magdalena (*chrysurus*), thence across the river and returning northward along the Cordillera Oriental to meet the range of *variabilis* through that of *zuliae*.

Of four specimens taken by H. M. Curran in May 1916, at "Puerto Estrella," Río Magdalena, at the mouth of the Cesar, three have been considered representative of typical *splendidus*. The fourth differs widely and agrees in every respect with *norosiensis*. It must be concluded that this example was taken on the opposite shore of the river. In this connection it may be mentioned here that among other indications of the importance of the lower Magdalena as a zoogeographic barrier, the author found the marmoset, *Marikina leucopus*, abundant from the Río San Pedro to the very edge of the Magdalena, but completely absent on the opposite shore.

Specimens examined.—Twenty-one. Norosí, 10 (U.S.N.M.); Río San Pedro, above Norosí, 10 (U.S.N.M.); "Puerto Estrella," 1 (U.S.N.M.).

SCIURUS GRANATENSIS PERIJAE, new subspecies

Holotype.—Adult male, skin and skull, U.S.N.M. No. 279892; collected December 25, 1942, by Philip Hershkovitz; original No. 1230.

Type locality.—Sierra Negra, above Villanueva, on the western slope of the Sierra de Perijá, Valledupar, Department of Magdalena, Colombia; altitude 1,265 meters.

Distribution.—Northern half of the Sierra de Perijá (Cordillera Oriental), Department of Magdalena, at altitudes ranging from approximately 800 to 2,500 meters. At lower altitudes, forms intergrading with *splendidus* on the west, and *maracaibensis* (*nomen novum*) to the east probably occur.

Characters.—Contrastingly colored, darker, with more black and smaller than *splendidus;* paler, with less black than *maracaibensis;* more contrastingly colored, less agouti, than *tarrae* and *meridensis.*

Coloration of holotype.—Pelage thick and soft. Mixed orange and black on lower half of back continued forward as a broad median dorsal band to nape, shoulder region more uniformly orange (xanthine orange); black tipped hairs plumbeous basally followed by successive bands of orange, black and orange, the lower orangeous band less red than the subterminal one, both bands becoming yellower toward posterior portion of body and on head. Sides of body like back but with less black and with broader bands of orangeous. Nose, sides of face, chin, and upper half of throat buffy. Hind legs, except for white ventral portions, mixed orange-rufous and black; forelegs more nearly uniformly orangeous. Belly, chest, neck, and lower half of throat sharply defined white. Tail above mars orange, the proximal portion mixed with black, on underside, the hairs with six bands, the basal black followed by successive bands of yellow, black, orange, black, and broadly orange terminally; the general effect is tricolor with mars orange externally, black medially, mixed black and yellow internally.

Measurements of holotype (in millimeters).—Head and body, 236; tail, 216; hind foot, 59; ear, 29; condylobasal length, 51.3; zygomatic breadth, 33.0; length of nasals, 17.0; orbital constriction, 18.9; postorbital width, 19.0; width of braincase, 23.5; alveolar length of molar row, 10.1.

Coloration of the paratopotypes (12 males, 17 females).—Most of the specimens, like the holotype, are of the contrasting agouti type. Ticked condition of rump continued forward as a median dorsal band sharply defining the orangeous or reddish shoulder regions. Red annulations of hairs of rump paler than corresponding ones of anterior half of back; in many individuals, these bands are yellowish and, together with the black, give an olivaceous appearance to rump. In some specimens there is a marked concentration of black on median dorsal portion of back. Two individuals are nearly uniformly reddish

on back and sides (xanthine orange to orange-rufous) and quite like specimens from the intermontane valley of the upper Río Cesar. One specimen is nearly uniformly agouti on dorsum and sides and shows a fine narrow black lateral line. Fore and hind feet may be orangeous, reddish, black, or mixed with a combination of these colors. There is a tendency here for the development of weak, pale postauricular tufts. Tails on upper surface orangeous or reddish, the tips, in some, mixed with black; on underside uniformly reddish, bicolor (reddish and orangeous), or tricolor (reddish, black, and either orangeous or mixed as in holotype). Underparts white with a notable tendency for reddish of sides to encroach, especially on belly and limbs.

Laguna de Junco, Sierra de Perijá (1 female): Specimen taken by M. A. Carriker, Jr., from the same general region as the others but from a higher altitude (8,000–9,000 feet). Like holotype but paler, with less contrasting shoulder regions, feet darker. In color of back, sides and character of pelage, it more nearly resembles representatives of *meridensis* from the Páramo de Tamá than any of the topotypes of *perijae*.

Las Marimondas (8 males, 8 females): The series was taken on the summit and both slopes of the Montes de Oca (Sierra de Perijá), at altitudes ranging from 800 to 1,500 meters. It includes examples from both the Río Ranchería and the Lake Maracaibo drainage systems. All individuals are of the contrasting type (4ab and 4ac, see p. 9). The agouti to black of rump extends forward as a well-defined median dorsal band on anterior half of back and continues onto nape and crown. Tails above reddish or orangeous with tips either mixed with black or entirely black; beneath, bicolor (reddish with either black or mixed orangeous and black), or tricolor, more or less as in holotype. Underparts from white as usual but with some patches of reddish to completely reddish; generally the individuals with more black on dorsum show also more black on tails and less white on underparts. One specimen with hind feet white, the color continuous with white line on ventral surface of limbs. Unlike one of the topotypes of *agricolae* with white feet, its soles show only a trace of albinism.

This series represents an intergrading population between the topotypes, *maracaibensis* and *tarrae*. About half of the series, where the contrasting agouti pattern (4ab) predominates, agrees well with average specimens of the type series while individuals of the remaining half, where the contrasting black pattern (4ac) predominates, could be assigned to either *maracaibensis* or *tarrae*.

Remarks.—The high degree of variation in *perijae* is analogous to that of *agricolae* and *saltuensis*, which, together, inhabit approximately the same altitudinal levels of the Sierra Nevada on the opposite side of the Cesar Valley. The lower opposing slopes of the two mountain

systems have been modified by man to the extent that the ecological conditions with the fauna characteristic of the valley, largely prevail. Since collecting in both mountains was done at greatly varying altitudinal levels, the squirrels reflect this in the variability of their coloration and in the length and texture of their pelage. Generally, the paler, more thinly furred individuals were taken at the lowest levels, and the darker, more heavily furred ones at the highest altitudes with a mixture of both kinds in the intermediate zones. As might be expected, in the case of the Sierra de Perijá, where collecting was done on both slopes and on the summit at altitudes between 800 and 2,500 meters, the large series of squirrels taken include individuals difficult to distinguish from the lowland *splendidus* and *maracaibensis*, the middle zone *zuliae* and *tarrae*, and the highland *meridensis*.

Specimens examined.—Forty-seven. Sierra Negra, 30 (U.S.N.M.); Las Marimondas, 16 (U.S.N.M.); Laguna de Junco, Sierra Negra, 1 (U.S.N.M.).

SCIURUS GRANATENSIS MARACAIBENSIS, new subspecies

Sciurus versicolor zuliae, Osgood, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 47, 1912 (*nec* Osgood, 1910).

Mesosciurus gerrardi zuliae, Allen, Bull. Amer. Mus. Nat. Hist., vol. 34, p. 246, 1915 (Río Aurare, Encontrados, and Empalado Savannas specimens, *nec* Osgood).

Holotype.—Adult female, skin and skull, C.N.H.M. No. 18733; collected January 17, 1911, by Osgood and Jewett; original No. 4118.

Type locality.—El Panorama, Río Aurare, a small river emptying into Lake Maracaibo, opposite the city of Maracaibo, Zulia, Venezuela; altitude near sea level.

Distribution.—From the lowlands surrounding Lake Maracaibo and the lower Río Catatumbo westward into the low passes of the Montes de Oca (Sierra de Perijá) of Venezuela and Colombia.

Characters.—Sharply contrasting black and reddish; with more black on upperparts and red on underparts than *perijae;* with more black, the shoulder regions more contrasting, than in *zuliae*.

Coloration of holotype.—Dorsal surface of body black with contrasting orange-rufous shoulder regions; hairs of rump and middorsum entirely black; anteriorly, hairs of dark median band to nape and crown annulated with capucine yellow; sides of face and chin buffy. Sides of body, limbs, and fore and hind feet orange-rufous; inner sides of thighs mixed with black; underparts orange-rufous with a broken white streak on midline of neck and tufts of white on axillae and upper arm. Tail above black on basal and terminal fourths, middle portion orange-rufous, basal one-fourth of undersurface bicolor (black with mixed black and yellow) becoming entirely black at basal third, followed by a middle tricolor portion (orangeous, black, mixed yellow and black) which terminally merges into the wholly black penciled tip.

Measurements of the holotype (in millimeters).—Head and body, 224; tail, 228; hind foot, 55; condylobasal length, 51.3; zygomatic breadth, 32.2; length of nasals, 17.1; supraorbital constriction, 17.9; postorbital width, 17.6; width of braincase, 22.3; alveolar length of molar row, 9.8.

Coloration.—The topotype, a female, is much like the holotype in coloration. It is in old pelage (new in the holotype), shows a broader median dorsal band and a less complicated pattern on undersurface of tail. A male from Encontrados (just below the confluence of the Ríos Zulia and Catatumbo) patterned like the holotype but shows more black on dorsum and deeper red (mars orange) on shoulder regions, limbs and underparts; tail above, black basally, orange medially, terminal third black, beneath black, with a slight mixture of orange medially and basally.

Remarks.—It appears that *maracaibensis* occupies the whole of the lowlands of the Lake Maracaibo Basin. It has been shown that it intergrades with *perijae* in the northern foothills of the Sierra de Perijá. Similarly, it is shown that it intergrades with representatives of *tarrae* (*nomen novum*) and *zuliae*.

Specimens examined.—Three. El Panorama, Río Aurare, Zulia, 2 (C.N.H.M.); Encontrados, Zulia, 1 (C.N.H.M.).

SCIURUS GRANATENSIS TARRAE, new subspecies

Holotype.—Adult female, skin and skull, U.S.N.M. No. 279964; collected July 25, 1943, by Philip Hershkovitz; original No. 2260.

Type locality.—Río Tarra, a small tributary of the upper Catatumbo, San Calixto, Department of Norte de Santander, Colombia; altitude about 200 meters.

Distribution.—In the southeastern portion of the Sierra de Perijá, the upper Río Catatumbo drainage area, west through low passes (to 1,000 meters) to the Río del Carmen drainage system on the western slope; altitudinal range from about 200 meters above sea level on the eastern side of the mountains to about 500 meters on the western side.

Characters.—Darkest of the northern Colombian and Venezuelan races; more uniformly dark agouti, with deeper red underparts and tail than *zuliae* and *maracaibensis*.

Coloration of holotype.—Dorsal surface from back of head to basal fourth of tail both above and below, black ticked with xanthine orange; sides of body and limbs more orange, the orangeous subterminal band of the hairs paler posteriorly than anteriorly; rostrum evenly mixed black and orangeous, sides of face paler, chin ochraceous. Underparts reddish, with xanthine orange on neck, orange-rufous on fore and hind limbs and sides of chest and belly grading to mars orange midventrally. Middle half of tail burnt sienna above, grizzled with burnt sienna, black and yellowish beneath; terminal fourth black both above and below.

Measurements of the holotype (in millimeters).—Head and body, 207; tail, 200; hind foot, 55; ear, 27; condylobasal length, 46.5; zygomatic breadth, 29.5; length of nasals, 16.8; supraorbital constriction, 16.5; postorbital width, 17.7; width of braincase, 22.5; alveolar length of molar row, 9.0.

Coloration of the paratopotypes (3 males, 6 females).—Throughout this dusky series, the pattern of blackish agouti with little contrast on the shoulder regions is consistent. Terminal portions of tails black in all specimens; in one specimen, middle orangeous portion of upper surface heavily mixed with black and limited to an area of about 2 inches in length; on undersurface, this tail is nearly entirely black except at base. In the series, the undersides of the tails may appear bicolor in middle portions with the outer band either black or reddish, or tricolor with an orangeous, a black, and a mixed yellow and black band. Underparts of body entirely reddish or with narrow patches of white along mid line.

This is a well-marked population distinguishable from *zuliae* by the redder (mars orange) sides and underparts, the greater amount of black on dorsum, and by slightly smaller average size. It is difficult to assign this series to any of the other named forms. It may eventually prove to be part of the gradient between *zuliae* and *maracaibensis*.

Guamalito (4 males, 3 females): Both geographically and in its characters, this series occupies a position between the topotypes of *variabilis* and *zuliae*. It consists of highly variable individuals with one specimen agreeing well with some of the typical forms of *perijae*, another with *maracaibensis*, though it has large patches of white on the belly. In general, however, the series is most like the topotypes of *tarrae*. Dorsally as dark as the Tarra specimens, but with shoulder regions more contrastingly reddish; ventrally with an approximately equal distribution of white and reddish, the former color persisting over a greater area than latter on throat, neck, chest, midventral line and around genitalia. Tails with more black than *variabilis*, less than in the Tarra series. The specimen, a subadult, agreeing with *perijae*, is orangeous with an even ticking of black spread lightly over the dorsum. The squirrels were taken at altitudes ranging from 600 to 1,000 meters above sea level.

Remarks.—The range of *tarrae* lies between those of *perijae* and *zuliae*, and parallels them in extending from east to west across the cordillera. Apparently, the distributional pattern of each of these forms follows closely the pattern of the fluvial systems in the Sierra. The system is pursued from near the base of the mountains to the divide, thence across to a connecting system on the other side.

Specimens examined.—Seventeen. Río Tarra, 10 (U.S.N.M.); Guamalito, 7 (U.S.N.M.).

SCIURUS GRANATENSIS ZULIAE Osgood

Sciurus versicolor zuliae Osgood, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 26, 1910.

Mesosciurus gerrardi zuliae, Allen, Bull. Amer. Mus. Nat. Hist., vol. 34, p. 246, 1915 (part, Orope specimens only).

Sciurus gerrardi cucutae Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 592, 1914 (El Guayabal).

Holotype.—Adult male, skin and skull, C.N.H.M. No. 16585; collected March 1, 1908, by Ned Dearborn.

Type locality.—Orope, a small railroad station on the Río Orope, a tributary of the Zulia, near the Colombian border, Zulia, Venezuela; altitude approximately 25 meters.

Distribution.—The upper Río Zulia drainage area in Colombia and Venezuela, south and west across the Cordillera Oriental to the Río Magdalena in Santander; altitudinal range from approximately 20 to 1,050 meters above sea level.

Characters.—Larger, darker, with more contrasting reddish shoulder regions than *griseogena* and *meridensis*, paler, less uniformly dark agouti than *tarrae*, paler with less contrasting shoulder regions than *maracaibensis*.

Coloration.—The four topotypes of *cucutae*, all females, and one female topotype of *zuliae* are at hand. In view of the short distance in the same general region separating the type localities of these two described forms, it is not surprising that they should conform exactly to each other. Apparently Allen based his distinctions on comparisons of the Guayabal specimens with those here described as *maracaibensis* but which he assigned to *zuliae*. In general, the Guayabal series and the topotype are dark agouti with comparatively little contrast in the shoulder regions; posterior half of back more nearly uniformly black than median dorsal band on anterior half. Underparts reddish except in one of the Guayabal specimens which shows a broad band of white on throat and neck, and white on axillae and pubic region. Tail above black basally and terminally, orangeous medially, underside grizzled basally, black terminally, tricolor (orange, black, grizzled) medially.

The most nearly agouti specimen of the Guayabal series serves to form an almost unbroken gradient in coloration between *zuliae* and the series of *griseogena* from San Julián. The topotype agrees more nearly than the others with specimens of *tarrae* from the upper Catatumbo.

Gramalote (2 females): Specimens from 30 kilometers west of Cúcuta, 1,020 meters altitude, are quite intermediate in characters between the Guayabal *zuliae* and the series of *meridensis* from the Páramo de Tamá. As compared with the former they are smaller, with longer, thicker pelage, less black on upper parts, less red on

underparts. They are nearest *zuliae* but illustrate that the altitudinal gradients in size, color and pelage have the same tendencies in both the Gramalote and the Páramo de Tamá branches of the Río Zulia fluvial system.

Puerto Santander (male and female): These specimens from the right bank of the Magdalena, altitude 60 meters, are practically identical with specimens from El Guayabal; the female has the same white markings on underparts as described for one of the Guayabal squirrels.

Remarks.—The position of *zuliae* is strategic both geographically and with relation to other subspecies of *granatensis* which have heretofore been considered specifically distinct. The type locality, in the angle of the node formed by the union of the Perijá and the Mérida ranges, is a crossroad through which intergradation between extreme forms of *granatensis* is demonstrated. Pursuing the Mérida range northeastward gradation into the pale agouti, or olivaceous, *griseogena* can be shown. Northward, along the Perijá range and into the Maracaibo basin, gradation into the blackish (*tarrae*) and the orangeous and contrasting black (*perijae* and *maracaibensis*) squirrels has been demonstrated. Westward, across the mountains, we find again a gradient leading to the contrastingly colored, white bellied *variabilis*. Southward, into the higher levels of the Eastern Andes (Páramo de Tamá), *zuliae* leads to *meridensis* which, in turn, is hardly distinguishable from the forms known as *griseimembra* and *candalensis;* at middle levels southward in the Eastern Andes, *zuliae* undergoes only a very slight transformation to become known as *chrysurus*.

Specimens examined.—Nine. Orope, 1 (C.N.H.M.); El Guayabal, 10 miles north of Cúcuta, 4 (C.N.H.M.); Gramalote, 2 (U.S.N.M.); Puerto Santander, 2 (U.S.N.M.).

SCIURUS GRANATENSIS GRISEOGENA (Gray)

Macroxus griseogena Gray, Ann. Mag. Nat. Hist., ser. 3, vol. 20, p. 429, 1867.
Sciurus griseogena klagesi Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 14, p. 240, 1914 (Galifare, near Caracas).

Type.—According to Allen (1915, p. 227) one of the specimens collected by Dyson in Venezuela and so indicated by Thomas on the label of the specimen. It has never been formally recorded as a lectotype.

Type locality.—Venezuela, designation by Thomas (1901, p. 193). Here further restricted to San Julián, near La Guaira, coast of Venezuela (see discussion *antea* p. 7).

Distribution.—Coast and low coastal ranges of Carabobo and the Caracas district, northern Venezuela.

Characters.—Pale agouti, olivaceous in appearance, with or without

a dark median dorsal band. Smaller and paler than *zuliae*, and without contrasting shoulder regions, pelage longer and softer.

Coloration.—Dorsum, sides of body and hind legs ticked with black and orange-buff to capucine yellow, a darker median dorsal band when present, weakly to moderately well-defined; sides of arms with more red; fore and hind feet orangeous lightly mixed with black to evenly agouti or nearly black. Underparts cadmium orange to orange-rufous. Basal portion of tail like back, tip black, middle portion orange above, below uniformly orange to more or less defined tricolor (orange, black, grizzled yellow, and black).

Remarks.—In referring *klagesi* to *griseogena*, Allen is followed. According to the original description, *klagesi* is a long-haired highland form paler than either *griseogena* or *meridensis*. Possibly it could be assigned to either race, and, in the light of present material, *klagesi* would seem to be an annectant population.

The most immediate affinities of *griseogena* are with *chapmani* and the Andean *meridensis* rather than with the coastal *maracaibensis*. It appears to be well isolated geographically from that coastal neighbor, and differs from it notably. At present, gradation between the two can be shown only through the intermediacy of *zuliae*.

Specimens examined.—Twenty. San Julián, 18 (U.S.N.M.); "Venezuela," 2 (U.S.N.M.).

SCIURUS GRANATENSIS MERIDENSIS Thomas

Sciurus griseogena meridensis Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 7, p. 192, 1901.

Sciurus griseogena tamae Osgood, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 48, 1912 (Páramo de Tamá).

Holotype.—Adult male, skin and skull, B.M. No. 98. 7. 1. 33; collected November 16, 1896, by Briceño.

Type locality.—Escorial, Sierra de Mérida, near Mérida, Venezuela; altitude approximately 2,500 meters.

Distribution.—Middle and upper levels of the Sierra de Mérida.

Characters.—Pelage longer and thicker, underparts redder than *griseogena;* ventral surface with or without patches of white, dorsum with tendency to contrasting shoulder regions, tip of tail black.

Remarks.—The specimens from Páramo de Tamá, described as *tamae*, average paler than the topotype series. They also tend to show a slightly sharper contrast in the shoulder regions, thus indicating more clearly integradation with *zuliae*.

The characters of *meridensis* are representative of the species as found in the higher levels of the Andes. These squirrels are comparatively small, thickly furred and olivaceous in appearance. Their underparts are usually uniformly red or orange but in individuals, patches of white may show. Local populations have been described

from widely separated points at altitudes ranging between 2,000 and 3,000 meters along the eastern Andes of Colombia and Ecuador. They form a fairly homogeneous group and nowhere can such sharp differences be found between any two of them as between two such neighboring coastal forms as *griseogena* and *maracaibensis*. Nevertheless, all along the lower borders of the range of these dusky highland squirrels, forms have been described which connect them with the larger, brightly colored coastal, or lowland, animals. It has been shown that *meridensis*, by way of the series from the Páramo de Tamá, grades into the lowland *maracaibensis* through the races *zuliae* and *tarrae*. In Ecuador the highland *carchensis* shows gradation into the coastal *versicolor* through the races *söderströmi* and *imbaburae* which occupy successively lower altitudinal levels. At the northern extreme of the Eastern Andes it has been noted that the longer-haired paler and more uniformly agouti representatives of *perijae* resemble individuals of *meridensis*. The former subspecies includes also individuals which lead to the lowland *maracaibensis* on one side and *splendidus* on the other.

Specimens examined.—Eleven. Montes de Escorial, Mérida, 2,500 meters, 2 (U.S.N.M.); Montes de la Culata, Mérida, 2,500 meters, 1 (U.S.N.M.); Montes de Hechizera, 2,000 meters, 1 (U.S.N.M.); Paramo de Escorial, 3,000 meters, 1 (U.S.N.M.); Montes de Chama, Mérida, 1,600–1,700 meters, 2 (U.S.N.M.); Montes de la Sierra, Mérida, 2,000 meters, 1 (U.S.N.M); Páramo de Tamá, 8,000 feet, 3 (C.N.H.M.).

GEOGRAPHIC VARIATION

A complete picture of the geographic variation within the species cannot be given here. The following discussion is based primarily upon the squirrels collected by the author in a small corner of the range in northern Colombia and some complementary material collected by others in adjacent regions. Of necessity, some references are made to more distantly located specimens. The localities from which squirrels are at hand represent almost completely all the major ecological subdivisions frequented by squirrels in the area under consideration (see map, fig. 1). The only important ecological community not satisfactorily represented is that of the highest altitudinal levels inhabited by squirrels in the Sierra Nevada de Santa Marta. A brief description of each of the collecting localities is given in the gazetteer (p. 40).

Commencing with the squirrels taken in the lowlands of the Río Magdalena, we find members of each of three markedly differentiated subspecies occupying adjoining ranges and subjected to the same environmental conditions. The type localities of these three races have been established at points so near to each other that an energetic

collector, with the aid of a canoe, could secure topotypes of all three forms in the same day. Norosí, the type locality of *norosiensis*, is situated in the Río Magdalena Valley at the foot of the Cordillera Central. Twenty-five kilometers east, on the opposite shore of the Magdalena near the base of the Cordillera Oriental, is La Gloria, type locality of *variabilis*. Forty-five kilometers downstream at the mouth of the Cesar is the type locality of *splendidus*. The genetic distinctiveness of *norosiensis* from the two races on the opposite side of the river may be explained on the basis of geographic isolation. The Río Magdalena at this point is hemmed in by the eastern and central Andes, its valley is relatively narrow and its main channel is much less subject to change than lower down in the flatlands. Though the differences which separate *variabilis* from *splendidus* are obvious, the geographical conditions that keep them separate are less clear. It seems, however, that the elbow of the Cordillera Oriental which marks the division of the Cesar Valley of the lower Río Magdalena from the valley of the middle Magdalena serves to isolate partially, at least, the two forms.

In the separate discussion under the subspecific headings it has been shown that on higher altitudinal levels of the Cordillera Oriental where the geographic barriers mentioned become neutralized, these three subspecies converge through a series of gradations into one and the same thing. Southward, up the Magdalena and eastward onto the Cordillera Oriental, *variabilis* becomes smaller and darker, the belly red, to grade into *zuliae* and *tarrae*, respectively. *S. g. norosiensis* must become only slightly smaller and darker up the Magdalena along the eastern slope of the Cordillera Central and across the Magdalena to the western slope of the Cordillera Oriental, to merge with *chrysurus* and *zuliae*, respectively. The Río Cesar squirrel, *splendidus*, on the other hand, in continuing up the main course of the Cesar Valley to its head, becomes progressively paler and thus diverges even more widely from the typical forms of the other two subspecies. What occurs along the east bank of the lower Magdalena to its mouth is not known. Typical *granatensis* west of the mouth of the main channel is paler than *splendidus* but appears to be a well-marked local form restricted to the *ciénagas* surrounding the low foothills of the northern terminus of the Cordillera Occidental. It is completely isolated from all the other races described in this paper. In the Río Cesar, once the valley bed is left for the eastern mountain chain, again the squirrels become smaller and darker. In the mountains overlooking the head of the Cesar *splendidus* intergrades with *perijae* which, in turn, intergrades with *tarrae*. Lower down, on the southwestern portion of the Sierra de Perijá, it may be confidently assumed that intergrading populations of *splendidus*, *variabilis*, *perijae*, and *tarrae* all occur.

A situation somewhat analogous to the above is presented by that of *maracaibensis* of the Maracaibo Basin and *griseogena* of the hilly northern coast of Venezuela. They are widely differing forms whose habitats are separated from each other by outlying ranges of the Cordillera de Mérida. The two races may intergrade along the coast, but no specimens are available from intermediate points to determine this. It has been shown, however, that both *maracaibensis* and *griseogena* grade into *zuliae*.

The squirrels from the eastern and southern slopes of the Sierra Nevada de Santa Marta show clearly their origin from the lowland *splendidus*. Like the others, they become progressively smaller and darker, or agouti, with increasing altitude. Unlike the squirrels of the Cordillera Oriental, however, their underparts are consistently sharply defined white, as in *splendidus*.

The squirrels of the highest forested altitudinal levels of the eastern Andes are of special interest. They are thickly furred, dusky, and more or less uniformly agouti. They contrast markedly with the larger, brightly colored squirrels of the lowlands. So different is their appearance that they have been described as specifically distinct. It seems, however, that each population of these highland squirrels has been derived directly from the squirrels of the next lower altitudinal zone. In the absence of any barrier over a large, well-defined area of the highlands, the several heterogeneously derived populations may merge into a distinct and homogeneous group. This obscures the fact that each population is the end product of a convergent, altitudinal cline which may have started, as in the case of *variabilis*, *splendidus*, and *norosiensis*, from three widely divergent forms in the lowlands. Examples of two populations of *meridensis* were examined. One series is from the Sierra de Mérida, the other from the Páramo de Tamá. The former shows direct gradation into *griseogena* while the latter shows its derivation from specimens of *zuliae* farther down the same river system. Similarly, *griseimembra*, of the *páramos* above Bogotá, though hardly distinguishable from *meridensis*, represents a terminus of the altitudinal gradient of which *chrysurus* of Bogotá is next below.

In the above it has been noted that at higher altitudinal levels the lowland squirrels are represented by smaller forms. This tendency to reduction in size is continuous, frequently *pari passu*, to the highest altitudinal levels inhabited by the squirrels of the species. We have seen that the lowland forms are represented by darker ones at the next higher altitudinal zone. Where the lowland form is contrastingly colored, black and reddish, the next altitudinally higher one is less contrasted due to the augmentation or more even distribution of the black pigment of the body. This suppresses, to varying degrees, the otherwise contrastingly reddish sides and shoulder regions. Where

the lowland form is quite, or nearly, uniformly reddish or orangeous, as in *splendidus*, the next higher form by the acquisition or increase of the black pigment becomes contrastingly colored. Finally, the lowland agouti forms (*norosiensis*) become darker agouti at the next higher levels. From these levels where the darker forms occur to the highest forested zones the length and thickness of the pelage increases. The reddish subterminal band of the hair becomes narrower and frequently paler or even yellowish, while the longer gray basal portions of the hairs tend to show through at the surface. This results in a paler, uniformly agouti, or olivaceous appearing animal. The underparts follow the same tendencies (except in the Sierra Nevada de Santa Marta). From the lowlands to the next altitudinally higher levels, reddish underparts are generally followed by deeper red underparts, white underparts by red, or mixed red and white underparts. At the highest levels, the red may persist, it may become yellow, or mixed red or yellow with white.

TABLE 1.—*Types of color patterns occurring among the populations of the subspecies* Sciurus granatensis

[In series with three or more color patterns the dominant ones are italicized. Altitudes given are those of the specific localities or represent the altitudinal range between which the squirrels were taken. See p. 9 for explanation of symbols]

Subspecies	Locality	Altitude	Number of specimens	Color-pattern symbols
		Meters		
variabilis	La Gloria	45	3	4b–4bc.
variabilis	Agua Chica	162	2	4bc.
zuliae	Puerto Santander	60	2	4bc.
tarrae	Guamalito	600–1,000	7	4bc–*3b*–3a.
tarrae	Tarra	200–350	10	4bc–3b.
zuliae	El Guayabal	150	4	4bc–3b.
zuliae	Oropo	25	1	4bc.
maracaibensis	Maracaibo	0–10	3	4bc.
perijae	Las Marimondas	800–1,500	16	4bc–4ac.
perijae	Sierra Negra	1,000–1,500	30	1–4bc–*4ac*–3b–3a.
splendidus	Villanueva	274	5	1–2.
splendidus	Nazaret	200	1	2.
splendidus	Río Cesar	140–158	66	1–2.
splendidus	Puerto Estrella	36	3	1.
granatensis	Guájaro	15	14	*2*–4b.
agricolae	Colonia Agrícola	250–800	17	1–2–*4ac*–4a.
agricolae	El Salado	350–850	20	1–2–*4ac*–*4a*–4bc.
saltuensis	Pueblo Bello	1,000–1,200	17	1–3a–*4ac*–*3b*–4bc.
bondae	Bonda	50	16	3a–*4ac*–4a.
griseogena	San Julián	Near sea level	19	3a–3b.
meridensis	Mérida	1,600–2,500	8	3a–3b.
meridensis	Tamá	2,438	3	3a–4ac.
zuliae	Gramalote	1,020	2	4ac–4b.
norosiensis	Norosí	90–120	10	3a–4ac.
norosiensis	San Pedro	150–250	10	*3a*–*4ac*–3b.

Table 1 shows the intergradation in color patterns. The localities have been arranged in an order showing geographical continuity. Where this continuity is broken, as between the Bonda series from the Sierra Nevada de Santa Marta and the San Julián series from northern Venezuela, a space on the chart separates their localities. The symbols for the patterns are explained on page 9. It will be noted that the color pattern does not describe the particular color tone or color phase on the dorsum, or the color of the underparts. Nevertheless, as shown in the descriptions and discussions, the gradations in the colors themselves, both of upper and lower parts, the extremities included, coincide with those of the color patterns.

SUPPLEMENTARY LIST OF THE SOUTH AMERICAN SUBSPECIES OF SCIURUS GRANATENSIS Humboldt

Unless otherwise indicated, the types and additional material including topotypes of the following named forms have been examined by the author.

SCIURUS GRANATENSIS GERRARDI Gray

Sciurus gerrardi Gray, Proc. Zool. Soc. London, 1861, pt. 1, p. 92, pl. 16, 1861.

Type locality.—New Grenada. Restricted by Allen (1915, p. 308) to "somewhere between the ranges of the *zuliae-cucutae* group . . . and . . . *baudensis* in northern Colombia."

Remarks.—Allen referred a specimen from the Río San Jorge, Bolívar, to *gerrardi*. Two squirrels, one from Montería, another from Jaraquiél, both on the Río Sinú, Bolívar, agree with the color plate of *gerrardi*. They are more red than typical *granatensis* and the tails of both are tipped with black. The specimens, collected by Carriker in 1916, are preserved in the Carnegie Museum.

SCIURUS GRANATENSIS SALAQUENSIS Allen

Sciurus gerrardi salaquensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 592, 1914.

Mesosciurus gerrardi baudensis Allen, Bull. Amer. Mus. Nat. Hist., vol. 34, p. 308, 1915 (Baudo).

Type locality.—Río Salaquí, a tributary of the Atrato, northern Chocó, Colombia.

Remarks.—Doubtfully separable from *morulus* Bangs.

SCIURUS GRANATENSIS VALDIVIAE (Allen)

Mesosciurus gerrardi valdiviae Allen, Bull. Amer. Mus. Nat. Hist., vol. 34, p. 309, 1915.

Type locality.—Puerto Valdivia, lower Río Cauca, Antioquia, central Colombia; altitude 360 feet.

SCIURUS GRANATENSIS LEONIS Lawrence

Sciurus milleri ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 31, p. 91, 1912 (preoccupied).

Sciurus gerrardi leonis LAWRENCE, Journ. Mamm., vol. 14, p. 369, 1933.

Type locality.—Cocal, western slope of Cordillera Occidental, upper Río San Juan region, Cauca Department, southwestern Colombia.

Remarks.—Questionably distinct from *inconstans*.

SCIURUS GRANATENSIS VERSICOLOR Thomas

Sciurus versicolor THOMAS, Ann. Mag. Nat. Hist., ser. 7, vol. 6, p. 385, 1900 (preoccupied).

Sciurus gerrardi inconstans OSGOOD, Journ. Mamm., vol. 2, p. 40, 1921 (new name for *versicolor* Thomas, "preoccupied" by *versicolor* Zimmerman, Spec. Zool. Geogr., p. 520, 1777. Zimmermann's name not valid).

Type locality.—Cachaví, upper Río Cachaví, Esmeraldas Province, northwestern Ecuador; altitude 500 feet.

SCIURUS GRANATENSIS MANAVI (Allen)

Guerlinguetus hoffmanni manavi ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 589, 1914.

Type locality.—Río de Oro, about 60 miles from the coast, Manaví Province, western Ecuador.

SCIURUS GRANATENSIS QUINDIANUS (Allen)

Guerlinguetus hoffmanni quindianus ALLEN, Bull. Amer. Mus. Nat. Hist., vol 33, p. 587, 1914.

Type locality.—Río Frío, western slope of Cordillera Central, on east bank of Río Cauca, Valle del Cauca Department, central Colombia; altitude 3,500 feet.

SCIURUS GRANATENSIS CHRYSURUS Pucheran

Sciurus chrysurus PUCHERAN, Rev. Zool. Paris, 1845, p. 337 (type an immature).

Sciurus hyporrhodus GRAY, Ann. Mag. Nat. Hist., ser. 3, vol. 20, p. 419, 1867 (Santa Fé de Bogotá).

Type locality.—"Santa Fé de Bogotá," central Colombia.

SCIURUS GRANATENSIS GRISEIMEMBRA (Allen)

Guerlinguetus griseimembra ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 589, 1914.

Type locality.—Buenavista, eastern slope of Cordillera Oriental, southeast of Bogotá, Cundinamarca, central Colombia.

SCIURUS GRANATENSIS CANDALENSIS (Allen)

Guerlinguetus candalensis ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 590, 1914.

Type locality.—La Candela, near San Agustín, Huila, south central Colombia; altitude 6,500 feet.

SCIURUS GRANATENSIS CARCHENSIS Harris and Hershkovitz

Sciurus candelensis [*sic*] *carchensis* HARRIS and HERSHKOVITZ, Occ. Pap. Mus. Zool. Univ. Michigan No. 391, p. 3, 1938.

Type locality.—Atal, Montúfar, near San Gabriel, Carchi Province, northern Ecuador; altitude about 2,900 meters.

SCIURUS GRANATENSIS SÖDERSTRÖMI Stone

Sciurus hoffmanni söderströmi STONE, Proc. Acad. Nat. Sci. Philadelphia, vol. 66, p. 14, 1914.

Notosciurus rhoadsi ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 585, 1914 (Pagma Forest, central Ecuador, immature of *söderströmi*).

Type locality.—Mount Pichincha, near Quito, central Ecuador.

SCIURUS GRANATENSIS IMBABURAE Harris and Hershkovitz

Sciurus gerrardi imbaburae HARRIS and HERSHKOVITZ, Occ. Pap. Mus. Zool. Univ. Michigan No. 391, p. 1, 1938.

Type locality.—Peñaherrera, Intag, western Imbabura Province, western Ecuador; altitude 1,500 meters.

SCIURUS [GRANATENSIS] FERMINAE Cabrera

Sciurus ferminae CABRERA, Trab. Mus. Nac. Cien. Nat., Madrid, vol. 31, p. 49, 1917.

Type locality.—Baeza, eastern slope of Cordillera Oriental, northeastern Ecuador.

Remarks.—Provisionally assigned to *granatensis* on basis of original description. No specimens were seen.

SCIURUS [GRANATENSIS] SUMACO Cabrera

Sciurus sumaco CABRERA, Trab. Mus. Nac. Cien. Nat., Madrid, vol. 31, p. 51, 1917.

Type locality.—San José, on the flanks of Mount Sumaco, northeastern Ecuador.

Remarks.—Provisionally assigned to *granatensis* on basis of original description. No specimens were seen.

SCIURUS GRANATENSIS CHAPMANI Allen

Sciurus chapmani ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 16, 1899.

Sciurus (*Guerlinguetus*) *quebradensis* ALLEN, *ibid.*, p. 217 (Quebrada Seca, northern Venezuela).

Type locality.—Caparo, Trinidad.

SCIURUS GRANATENSIS TOBAGENSIS Osgood

Sciurus tobagensis OSGOOD, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 27, 1910.

Type Locality.—Island of Tobago, British West Indies.

SCIURUS GRANATENSIS NESAEUS G. M. Allen

Sciurus nesaeus ALLEN, Proc. Biol. Soc. Washington, vol. 15, p. 93, 1902.

Type locality.—El Valle, Margarita Island, Venezuela.

TABLE 2.—*External and cranial measurements of the subspecies of* Sciurus granatensis *of northern Colombia and northwestern Venezuela*

[Measurements in millimeters, of adult specimens only. The measurements for each character show the mean, the extremes (in parentheses), followed by the number of specimens measured]

Subspecies and locality	Head and body	Tail	Hind foot	Ear (from notch)	Condylobasal length	Zygomatic breadth
variabilis:						
La Gloria	240. 3(229–249) 3	224. 7(211–242) 3	59. 7(58–61) 3	30. 7(30–31) 3	53. 1(51. 5–54. 7) 2	33. 6(33. 6–33. 7) 2
splendidus:						
Río Cesar	242. 7(200–266) 52	240. 0(203–269) 50	61. 2(56–65) 52	31. 0(26–36) 52	53. 2(51. 3–56. 2) 44	33. 4(31. 0–35. 3) 42
Villanueva	243. 6(237–250) 5	249. 8(238–265) 5	61. 0(60–63) 5	31. 2(30–32) 5	52. 8(51. 8–53. 7) 5	33. 4(32. 5–34. 6) 4
perijae:						
Sierra Negra	232. 6(222–250) 23	223. 6(200–248) 21	58. 0(55–61) 23	29. 2(28–32) 23	50. 4(48. 0–53. 1) 20	32. 0(30. 4–33. 3) 20
Marimondas	220. 1(207–231) 16	214. 9(198–229) 15	56. 4(54–59) 16	27. 7(26–29) 16	48. 8(46. 4–50. 4) 11	31. 3(30. 5–32. 3) 12
maracaibensis:						
Maracaibo	222. 0(220–224) 2	214. 0(200–228) 2	52. 5(50–55) 2	(25) 1	51. 3(51. 3–51. 4) 2	32. 7(32. 2–33. 3) 2
tarrae:						
Río Tarra	214. 4(207–225) 9	202. 5(191–218) 7	54. 7(52–58) 9	26. 7(25–28) 9	47. 8(45. 8–51. 4) 9	30. 9(28. 9–32. 5) 9
Guamalito	223. 2(209–240) 5	205. 2(201–208) 5	57. 0(55–58) 5	28. 4(26–30) 5	49. 8(48. 9–50. 5) 3	31. 8(31. 3–32. 5) 4
zuliae:						
Río Zulia	215. 0(207–222) 5	189. 6(170–201) 5	54. 6(51–59) 5		50. 1(47. 5–51. 8) 3	32. 1(29. 5–33. 6) 3
Puerto Santander					51. 6(51. 0–52. 3) 2	33. 7(33. 0–34. 4) 2
Gramalote					(48. 0) 1	(31. 4) 1
meridensis:						
Tamá	218. 7(216–223) 3	181. 7(176–193) 3	54. 0(53–55) 3		46. 8(46. 1–47. 5) 2	(30. 8) 1
Mérida					45. 2(44. 1–47. 7) 3	29. 1(27. 8–30. 7) 7
griseogena:						
San Julián					45. 5(44. 6–46. 5) 12	29. 4(28. 5–31. 4) 13
granatensis:						
Guájaro	228. 5(215–264) 14	219. 3(197–243) 14	57. 1(54–59) 14	29. 0(28–31) 14	50. 3(48. 4–53. 0) 10	32. 3(30. 0–33. 9) 9
bondae:						
Bonda	244. 7(216–285) 10	229. 0(195–252) 9	59. 1(57–63) 9		51. 2(50. 6–51. 7) 8	32. 2(30. 8–33. 3) 7
agricolae:						
Caracolicito	231. 6(208–248) 16	221. 6(198–240) 14	58. 1(54–61) 17	29. 5(28–31) 17	51. 2(48. 0–52. 8) 13	32. 1(29. 7–33. 0) 9
El Salado	231. 2(212–250) 18	234. 8(203–260) 17	58. 9(56–61) 18	29. 7(28–32) 18	51. 2(47. 5–54. 3) 17	32. 3(29. 9–34. 0) 15
saltuensis:						
Pueblo Bello	224. 0(210–245) 15	207. 9(198–226) 15	56. 7(55–58) 15	28. 1(26–31) 15	49. 1(47. 0–50. 9) 14	30. 9(29. 8–32. 2) 14
norosiensis:						
Norosí	244. 4(213–268) 9	226. 0(207–248) 9	61. 4(60–64) 9	28. 8(27–30) 9	52. 2(49. 5–54. 5) 8	33. 6(31. 9–34. 8) 7
San Pedro	244. 3(234–263) 10	224. 1(214–241) 8	62. 3(60–65) 10	29. 6(27–31) 10	54. 8(53. 3–55. 9) 9	35. 0(34. 0–35. 7) 9

Subspecies and locality	Nasals, length	Supraorbital constriction	Postorbital width	Braincase width	Molar row, alveolar length
variabilis:					
La Gloria	19.1(18.9–19.4) 2	17.8(17.7–17.9) 2	18.3(17.8–18.8) 2	23.3(22.8–23.7) 2	10.0(10.0–10.0) 2
splendidus:					
Río Cesar	18.6(17.0–20.7)29	18.6(17.0–19.9)48	18.5(17.3–19.3)47	23.3(22.0–24.4)40	10.0(9.4–10.6)47
Villanueva	19.3(18.7–19.6) 5	18.6(18.1–19.4) 5	18.6(18.3–19.3) 4	23.6(23.0–24.9) 5	10.1(10.0–10.2) 5
perijae:					
Sierra Negra	17.6(16.4–19.1)19	17.6(16.2–18.9)23	18.4(17.0–19.4)21	23.2(21.8–24.0)17	9.8(9.2–10.7)19
Marimondas	16.3(15.8–17.2)12	17.7(16.6–18.9)14	18.1(17.2–19.2)14	23.0(22.4–23.7,12	9.3(8.4–10.0)15
maracaibensis:					
Maracaibo	17.4(16.6–18.1) 3	17.6(17.0–18.0) 3	17.8(17.6 18.6) 3	22.7(22.3–23.1)2	9.7(9.6– 9.8) 3
tarrae:					
Río Tarra	16.4(14.8–18.1) 8	16.4(15.5–17.3) 9	17.8(16.9–18.5) 9	22.4(21.2–24.0) 6	9.2(8.7–10.0) 9
Guamalito	16.7(16.4–17.2) 5	17.2(16.5–18.7) 5	18.2(17.6–18.8) 4	23.4(22.9–24.4) 4	9.2(8.8– 9.4) 5
zuliae:					
Río Zulia	17.6(16.9–18.3) 4	17.0(16.2–18.2) 4	18.1(17.3–18.7) 4	22.6(22.2–23.0) 2	9.9(9.6–10.1) 5
Puerto Santander	17.6(17.4–17.9) 2	18.5(18.4–18.7) 2	18.4(18.1–18.7) 2	23.4(23.4–23.4) 2	9.8(9.7– 9.9) 2
Gramalote		(17.1) 1	(18.5) 1	(23.4) 1	(8.9) 1
meridensis:					
Tamá	15.9(15.6–16.1) 3	15.9(15.4–16.4) 3	18.7(18.6–18.8) 2	23.5(23.1–24.0) 2	9.2(9.0– 9.4) 3
Mérida	15.9(15.0–17.0) 7	15.8(14.5–16.6) 8	17.9(16.9–19.3) 7	22.3(21.6–23.3) 5	9.0(8.4– 9.4) 8
griseogena:					
San Julián	16.0(15.1–17.1)15	15.3(14.9–16.8)13	18.0(17.2–18.8)12	22.1(21.4–22.8) 9	9.0(8.6– 9.6)15
granatensis:					
Guájaro	17.6(16.6–19.7)12	17.8(16.8–19.1)10	18.2(17.2–19.0)10	23.7(23.3–24.0) 7	9.7(9.2–10.1)12
bondae:					
Bonda	18.4(17.2–19.3) 9	18.3(16.8–18.9) 8	18.6(17.7–19.4) 8	23.3(22.9–24.0) 9	9.8(9.4–10.1)10
agricolae:					
Caracolicito	18.1(16.6–19.4)12	18.1(16.5–18.7)14	18.0(17.3–18.8)14	23.0(22.3–23.9) 9	9.8(9.2–10.3)14
El Salado	18.1(16.8–20.0)16	18.0(16.0–19.5)17	18.5(17.8–19.0)17	23.5(22.5–24.5)14	9.9(9.3–10.3)17
saltuensis:					
Pueblo Bello	17.1(15.7–18.4)14	17.1(15.7–17.8)14	17.9(16.4–19.0)13	23.0(22.0–23.6)13	9.5(9.0–10.0)14
norosiensis:					
Norosí	18.0(16.5–19.0) 7	17.8(16.4–18.9) 8	18.8(18.3–19.7) 6	23.8(22.8–24.3) 7	9.5(9.1–10.2) 8
San Pedro	18.4(17.2–19.7) 8	18.5(17.3–20.0) 9	18.9(17.2–19.8)10	24.4(24.0–25.0) 8	9.6(9.3–10.5)10

DESCRIPTIONS OF THE LOCALITIES MENTIONED IN THE TEXT

Localities marked with an asterisk (*) are the author's collecting stations. Others visited or seen by the author but where either no squirrels were taken or no collecting at all was done by him are marked with a dagger (†). For aid in compiling descriptions of some of the stations not visited by the author in the Santa Marta district and in Venezuela, information was taken from Carriker, in Todd and Carriker (1922), and from Osgood (1912), as well as other reliable sources. Unless otherwise indicated, the name of the collector, or remitter, of the squirrels examined is given in parentheses at the end of each description. A complete account of the collecting stations and itineraries of the author in northern Colombia will be given in the final report on the collection.

Aguachica (162 meters), 8°18′ N., 73°37′ W., Magdalena, Colombia. A large town at the base of the Cordillera Oriental about 14 kilometers east of the Río Magdalena port, Gamarra (Carriker).

Bonda† (50 meters), 11°17′ N., 74°7′ W., Magdalena, Colombia. A small village on the Río Manzanares, between 8 and 9 miles east of Santa Marta, in the Sierra Nevada de Santa Marta region. The country lies in the semiarid coastal belt and is covered, in great part, with dry forest with intervals of open grass land on the ridge. Brown collected here, working along the river valley and on the mountain slopes to the southeast up to 6,000 feet or more. His specimens are all labeled "Santa Marta" or "Santa Marta Mountains." This village was Smith's headquarters. Most of his collecting was done at somewhat higher elevations.

Cartagena† (sea level), 10°26′ N., 75°31′ W., Bolívar, Colombia. Important seaport of the Caribbean. Also, the name formerly applied to the whole of what is now the department of Bolívar. Humboldt landed at Cartagena from Cuba on his way to Bogotá *via* the Río Magdalena. To escape the bad climate of Cartagena while preparing for this trip, he stayed most of the time in the nearby village of Turbaco.

*Ciénaga de Guájaro** (15 meters), 10°37′ N., 75°2′ W., Atlántico, Colombia. A large shallow lake between Barranquilla and Cartagena, varying from 10 to 20 meters above sea level, according to season. It is part of the lower Río Magdalena swamplands. The low hills surrounding the lake attain a maximum height of 520 meters and are isolated prolongations of the Andean Chain. The region is characterized by pastures, palm groves, and patches of low, thick, scrubby forest, mainly *rastrojo*, the whole interspersed with small cultivated plots, chiefly cornfields. Semiarid tropical zone; the dry season lasts from the end of November into April. Author's camp situated on higher ground, about 50 meters altitude, near the village of Arroyo de Piedra.

Cincinnati† (1,480 meters), 11°9′ N., 74°2′ W., Magdalena, Colombia. A coffee plantation on the western slopes of Mount Lorenzo, Sierra Nevada de Santa Marta. It was known as Valparaiso when Smith and Brown collected there. Carriker began working there in 1911. The plantation lies between altitudes of 900 to 1,700 meters and involves the dry tropical forests as well as the humid subtropical forests.

*Colonia Agrícola de Caracolicito** (335 meters), 10° 18′ N., 74° W., Magdalena, Colombia. An agricultural colony established by the Colombian government in the valley of the middle Río Ariguaní on the southern slope of the Sierra Nevada de Santa Marta. The region has been alternately cultivated and abandoned by the Indians since pre-Columbian times and most of the present forest, which is again being cut over, is not virgin. The region is well drained and highly accidented; the hills enclosing the valley rise to over 1,000 meters above sea level.

Don Diego (sea level), 11°15′ N., 73°43′ W., Magdalena, Colombia. An old plantation on the north coast at the mouth of the Río Don Diego. The region is humid and heavily forested (Carriker).

El Guayabal† (150 meters, approximately), 8°1′ N., 72°31′ W., Norte de Santander, Colombia. A station 14 kilometers by rail north of Cúcuta on the railroad line to Puerto Villamizar. It is located on the banks of the Quebrada de la Florista, a tributary of the Zulia. The conditions are intermediate between the arid scrubland of Cúcuta and the humid forests about Puerto Villamizar. Collecting may have been done at 1,000 feet above sea level, but the station itself is at a considerably lower altitude than Cúcuta with an elevation of 215 meters (Osgood and Jewett).

*El Orinoco, Río Cesar** (158 meters), 10°9′ N., 73°26′ W., Magdalena, Colombia. Camp on the main channel of the Río Cesar. A tropical, forested floodland area with many large open pastures on both banks. Cattle from the interior are driven here to graze during the dry season (December through May).

El Panorama, Río Aurare (sea level), Zulia, Venezuela. A site on the Río Aurare, southeast of Altagracia. It is on the higher ground of the arid region adjacent to the swamps and *manglars* on the east side of Lake Maracaibo (Osgood and Jewett).

*El Salado** (430 meters), 10°22′ N., 73°29′W ., Magdalena, Colombia. A collecting station on the mule trail about halfway between Pueblo Bello and Valencia, on the eastern slope of the Sierra Nevada de Santa Marta. The site is in the center of a broad belt of forest and *rastrajo* which separates the savannas of the Río Cesar Valley from those of Pueblo Bello.

Encontrados (10 meters), 9°4′ N., 72°14′ W., Zulia, Venezuela. A town at the junction of the Ríos Zulia and Catatumbo in the humid tropical plain southwest of Lake Maracaibo (H. F. Raven).

Gramalote (1,020 meters), 7°53′ N., 72°47′ W., Norte de Santander, Colombia. A town on a tributary of the Río Zulia about 30 kilometers west of Cúcuta (Hermano Nicéforo María).

*Guaimaral, Río Cesar** (140 meters), Magdalena, Colombia. A *caño* or channel west of the main channel of the Río Cesar. Camp about 5 kilometers east of El Orinoco. Heavily forested and more frequently flooded than the El Orinoco area.

*Guamalito** (600 meters, approximately), 8°34′ N., 73°27′ W., Norte de Santander, Colombia. A station about 3 kilometers below the town of El Carmen; it is in the semiarid deforested valley of the Río del Carmen on the western slope of the Sierra de Perijá. Some dry forest exists in the ravines of the opposing slopes of the valley but a more humid and heavier forest occurs on the summits and outer slopes of the ranges forming the valley. Much of the collecting was done in these forests, to an altitude of 1,000 meters.

*La Gloria** (45 meters), 8°37′ N., 73°48′ W., Magdalena, Colombia. River port on the right bank of the Magdalena. Collecting was done at Puerto Sagoc about 2 kilometers lower down. This region, in the valley between the foot of the Cordillera Central and the Cordillera Oriental, marks the end of the middle Río Magdalena before it joins the Cauca and spreads into the vast flood plain of its lower course.

Laguna de Junco† (2,240 meters), 10°32′ N., 72°54′ W., Magdalena, Colombia. In the Sierra Negra, on a hillside facing the Cerro Pintado (3,000 meters) from the north; about 7 kilometers southwest of the author's camp in the Sierra Negra and a kilometer and a half east of Carriker's base for ascending the Cerro Pintado. It is a small lake overgrown with rushes and completely dry during the dry season (Carriker).

*Las Marimondas** (1,000 meters, approximately), 10°52′ N., 72°43′ W., Magdalena, Colombia. Farm in the Sierra de las Marimondas near the summit of the Sierra de Perijá just south of the Montes de Oca. The locality is one of a few small coffee plantations in the drainage of the Río Ranchería. The mountain range here is low and narrow; its summits, which form the Colombia-Venezuelan boundary, range from 1,200 to 1,500 meters above sea level. Collecting was done on both sides at altitudes between 800 and 1,500 meters. Rain forest, from upper tropical to subtropical.

Mamatoco† (15 meters, approximately), 11°15′ N., 74°9′ W., Magdalena, Colombia. A village on the Manzanares, 4 miles east of Santa Marta. The area is one of low rocky hills and arid scrublands (Carriker).

Minca† (600 meters, approximately), 11°12′ N., 74°4′ W., Magdalena, Colombia. A station on the western slope of the Sierra Nevada de Santa Marta about 14 miles from Santa Marta on the road to Cincinnati at the point where it crosses the Río Gaira. It is in a zone between the arid scrublands of the lowlands and the humid mountain forest (Carriker).

Mérida (1,641 meters), 8°36′ N., 71°9′ W., Mérida, Venezuela. In the Sierra de Mérida; the city is situated on a mesa between the Río Chama and one of its tributaries, the Río Albaregas. In the valleys conditions are tropical to subtropical but mountains rise abruptly on either side and temperate forests are accessible within a few hours' travel. Briceño Gabaldán, a dealer in natural-history specimens, resided in one of the numerous coffee plantations surrounding the city. Most of the names of localities on the labels of his specimens are of these coffee plantations.

Montes de Chama, Mérida, Venezuela. Forests on the slopes of the Río Chama valley, near Mérida. The squirrels were taken between 1,600 and 1,700 meters above sea level (Briceño).

Montes de la Culata, Mérida, Venezuela. La Culata is the northern range of the Sierra de Mérida, north of the city of Mérida. The squirrels sent by Briceño came from the temperate zone forests (2,500 meters altitude), above the Río Chama. La Culata is also the name of a site 20 kilometers northeast of Mérida, altitude 4,487 meters, at the head of the Quebrada Mucujún.

Montes de Escorial, Mérida, Venezuela. Forests on the mountains near Mérida. Squirrels taken at 2,500 meters altitude (Briceño).

Montes de la Sierra, Mérida, Venezuela. Refers to some wooded area, in the mountains near the city of Mérida. Squirrels recorded from 2,000 meters (Briceño).

Montes de Hechizera, Mérida, Venezuela. Wooded area near the city of Mérida. Squirrels taken at 2,000 meters (Briceño).

Nazaret (200 meters), 12°11′ N., 71°18′ W., Guajira, Colombia. A mission situated at the base of the isolated Serranía de Macuire, at the tip of the Guajira Península. The squirrel was taken by Wetmore and Carriker at an altitude of 800 feet. The Serranía attains a maximum elevation of 822 meters.

*Norosí** (120 meters), 8°39′ N., 74°2′ W., Bolívar, Colombia. A village at the northern foot of the Central Andes on the edge of the Río Magdalena swamplands. The forests here are broken by numerous pastures and small savannas. Collecting was done from the village itself, and from the site, "Candela," altitude 99 meters, in the swampland on left bank of the Río Norosí below the village.

Orope (25 meters), 8°27′ N., 72°19′ W., Zulia, Venezuela. A railroad station on the Río Orope, 8 kilometers east of where the Río Zulia crosses the Colombia-Venezuelan boundary. It is in the humid tropical forest at the northern base of the Sierra de Mérida in the Lake Maracaibo basin (Dearborn).

Palomino (or "*Palomina*"), 11°7′ N., 73°34′ W., Magdalena, Colombia. An Indian village on the northern slope of the Sierra Nevada de Santa Marta. It is on the right bank of the Río Palomino, northwest of Pueblo Viejo and about 15 kilometers up from the mouth of the river. Brown gave the altitude as 5,000 feet. This may be correct, but, according to Carriker, Brown never did collect there in person. The specimens were brought to him by an Indian trader.

Páramo de Escorial, Mérida, Venezuela. In the Sierra de Mérida; near the town of Mérida. *Páramo* refers, usually, to the grasslands of the high mountains above timber line. But the temperate forests above tropical or subtropical valleys are often called *páramos* by the valley inhabitants. The altitude of 3,000 meters given by Briceño for the squirrels is certainly above timber line in this area.

Páramo de Tamá, 7°24′ N., 72°26′ W., Colombia-Venezuela. A mountain mass in the Cordillera Oriental at the head of the Táchira River between Colombia and Venezuela. It supports a temperate-zone forest but the summit of the principal peak (3,329 meters) is without timber. Squirrels taken at 8,000 feet (Osgood and Jewett).

*Pueblo Bello** (1,067 meters), 10°24′ N., 73°39′ W., Magdalena, Colombia. A village on a savanna mesa between the upper Río Ariguaní and its tributary, the Ariguanicito, on the southern slope of the Sierra Nevada de Santa Marta. The whole region with the inner facing slopes of the surrounding hills is grassland except for isolated patches of forest in the ravines and precipitous slopes not suitable for agriculture or grazing. Obviously the region has been stripped almost bare of forest by repeated cutting and burning since pre-Columbian times. Savannas dominate the region from Pueblo Bello to San Sebastián and higher. The outer slopes of the hills to the west, south, and southeast are heavily forested. Humid subtropical.

This is the Pueblo Viejo (Sur) of maps and sometimes has been confused with the Pueblo Viejo where Brown collected.

Pueblo Viejo (853 meters), 10°59′ N., 73°26′ W., Colombia. A relatively new hamlet replacing the extinct village of San Antonio on the northern slopes of the Sierra Nevada. The village is on the Río San Antonio above its junction with the Río Macotama, whence it continues to the sea as the Río San Miguel. It lies among grass-covered hills between the tropical and subtropical zones. Several trails lead out of Pueblo Viejo, one of them west to the Indian village of Palomino. Brown gave the altitude of Pueblo Viejo as 8,000 feet. Due to this exaggeration in altitude, it was believed by Allen that Brown collected in Pueblo Viejo (Sur) on the southern slope of the mountains (see Pueblo Bello) which, though higher in altitude, is still much lower than 8,000 feet.

Puerto Estrella† (36 meters), 8°58′ N., 73°56′ W., Magdalena, Colombia. A small port on the right bank of the Magdalena, a few kilometers above El Banco, in the deltalike *ciénaga* forming the mouth of the Cesar (Curran).

Puerto Santander (60 meters), 7°45′ N., 73°47′ W., Santander, Colombia. Small port on the right bank of the Río Magdalena, on the pipe line between Barranca Bermejo and Gamarra (Hermano Nicéforo María).

San Julián (near sea level), 10°36′ N., 66°51′ W., Venezuela. On the warm, arid northern coast of Venezuela about 7 miles east of La Guaira. The hamlet, consisting of a few scattered huts, is located in an irrigated valley above the village of Caraballeda. The mountains behind San Julián are well forested (Robinson and Lyon).

*San Pedro, Río**, Bolívar, Colombia. A tributary of the Norosí entering on the left below the village of Norosí at the foot of the Central Andes. Collecting was done from the site Peñas de Navarro, altitude 178 meters. Region humid and heavily forested.

San Sebastián† (1,909 meters), 10°37′ N., 73°34′ W., Magdalena, Colombia. A picturesque Indian village in the fertile basin of the Río San Sebastián (Fundación) on the southern slope of the Sierra Nevada de Santa Marta. The surroundings are grass lands cut out of the original lower Temperate Zone forests. The land rises abruptly to the north, is extremely rocky, and continues through the *páramos* to the snow-capped peaks. The land to the south is hilly and grassy. The valley of the San Sebastián drops gradually westward, passing through beautiful humid forests. To the east there is a trail which leads through a pass and continues down the eastern slope of the mountain mass through a somewhat drier forest before ending in the semiarid valley of the Río Cesar (Brown).

Santa Marta†, Colombia. Many old records given as "Santa Marta" do not necessarily refer to the town or to the "Santa Marta district" as now understood. During the period when present-day Colombia was known as New Granada, Santa Marta represented the western half of what is today the Department of Magdalena. It included the area east of the Río Magdalena from the Santa Marta Mountains south to the mouth of the Cesar. The eastern portion of the present department was, and still is, known as Valledupar. Specimens labeled "Santa Marta" by collectors who antedated Simon, Smith, and Brown are more likely to have been taken anywhere on the right bank of the Magdalena from its mouth to the confluence with the Río Cesar. Early specimens from the left side of the Magdalena may have been labeled "Cartagena," and correctly so, as the present departments of Atlántico and Bolívar were so known in the New Granadine period.

"Santa Marta Mountains," Magdalena, Colombia. Specimens so labeled by Brown were taken anywhere from near Santa Marta, at sea level, to several thousand feet higher on the western slope of the Sierra Nevada de Santa Marta. See *Bonda*.

*Sierra Negra**, Magdalena, Colombia. The so-called "Black Mountains" or western range of the Sierra de Perijá overlooking the town of Villanueva in the semiarid Cesar Valley. The well-drained slopes of the range from 1,000 to 1,500 meters above sea level are given over almost entirely to coffee plantations. Higher up, to the summits, 1,500–3,000 meters, and eastward in Venezuela, virgin rain forests prevail; lower down, on the western slope, the country is semiarid with a mixture of grass and scrub. Collecting station, Pajalito, in the Sierra Negra was situated almost due east above Villanueva at an altitude of 1,265 meters.

*Tarra, Río** (200 meters, approximately), 8°36′ N., 73°1′ W., Norte de Santander, Colombia. A tributary of the upper Río Catatumbo on the eastern slope of the Sierra de Perijá, and not to be confused with the much larger Río Tarra of the lower Catatumbo in Venezuela. The author's collecting station was in the deep, broad, humid tropical valley of the Tarra in an abandoned road camp of the Colombian Petroleum Company. The region is almost continuously rainy except for a definite dry season from mid-December through March. It is densely covered with virgin forests and inhabited by a small population of the primitive Motilón Indians.

*Villanueva** (274 meters), 10°37′ N., 72°58′ W., Magdalena, Colombia. A town at the base of the Sierra Negra (Cordillera Oriental) in the upper Río Cesar valley. The region is semiarid with a scattering of low scrubby vegetation. There still remain, however, a few isolated stands of deciduous forest which once were continuous with the forests of the Magdalena.

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NEW CERAMBYCID BEETLES BELONGING TO THE TRIBE RHINOTRAGINI

By W. S. Fisher

This paper is the result of a study of the cerambycid beetles belonging to the tribe Rhinotragini that have accumulated in the collection of the United States National Museum. Specimens have been received at various times for identification, many of which are undescribed forms, and it seems advisable to describe these so that names will be available for use in economic studies.

Genus CANTHAROXYLYMNA Linsley

CANTHAROXYLYMNA LINSLEYI, new species

Male.—Elongate, strongly flattened above, subopaque, yellowish brown, except mandibles, top of head, anterior margin of pronotum behind eyes, a broad fascia at base, in front of middle and at apices of elytra, posterior part of metasternum and metasternal episternum, and third abdominal sternite, which are black, and the first seven segments of antenna, tibiae, and apices of anterior and middle femora, which are more or less dark brown.

Head prolonged into a short snout, coarsely, densely punctate on occiput, with a smooth, longitudinal, median space; eyes large, rather deeply emarginate, and nearly contiguous on front; antenna slightly expanded toward apex, with apical segments subtriangular.

Pronotum slightly longer than wide, slightly wider at base than at apex, widest at middle; sides slightly, arcuately rounded; surface very

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coarsely, shallowly, irregularly punctate, with a few inconspicuous, erect hairs. Scutellum narrow, elongate, rather densely pubescent.

Elytra extending to base of fourth abdominal sternite, at base slightly wider than pronotum at middle, three times as long as pronotum; sides very broadly, shallowly constricted at middles, the apices broadly, transversely truncate, with the exterior angle on each elytron slightly produced; surface coarsely, densely, uniformly punctate, the punctures forming large, rather deep pits, which are confluent on the black median fascia, and with a few inconspicuous, short, erect hairs.

Abdomen beneath sparsely, coarsely, shallowly punctate, sparsely clothed with inconspicuous, short, erect hairs; last visible abdominal sternite broadly, deeply concave; first segment of posterior tarsus subequal in length to the following three segments united.

Female.—Differs from the male in having the eyes smaller and separated from each other on the front by about twice the diameter of the antennal scape, the apical segments of the antenna more slender, and the last visible abdominal sternite not concave.

Length 7.5 mm., width 1.6 mm.

Type locality.—Hamburg Farm (situated on the Limón Plain along the Reventazón River), Costa Rica.

Type and allotype.—U.S.N.M. No. 57671.

Remarks.—Described from a male and female (male type) collected on dry wood at the type locality, July 1, 1929, by Ferdinand Nevermann.

This species is allied to *Cantharoxylymna bicolor* Linsley, but it differs from the description given for that species in having the disk of the pronotum entirely yellowish brown, in not having the first segment of the posterior tarsus as long as the following four segments united, the tarsi and middle and posterior tibiae entirely black, and a black ring near the apex of the posterior femur.

Genus OXYLYMMA Pascoe

OXYLYMMA TUBERCULICOLLIS, new species

Female.—Elongate, moderately flattened above, subopaque, brownish yellow, except eyes, top of head, tips of mandibles, antennae in part, scutellum, basal and median fasciae on elytra, metasternum, and upper margin of anterior and middle femora and all tibiae, which are black or brownish black.

Head prolonged into a short snout, coarsely, sparsely punctate on front, densely, finely punctate on occiput, transversely rugose behind eyes, with a deep, narrow, longitudinal groove on front, clothed with a few short, inconspicuous, erect hairs; eyes large, moderately emarginate, widely separated on the front. Antenna filiform, extending to

middle of elytra, brownish or brownish black, except segments 1, 5, and 6, which are yellowish, sparsely clothed on underside with a few rather long, semierect hairs; segment 1 slightly expanded toward apex, three-fourths as long as third, which is twice as long as fourth.

Pronotum distinctly wider than long, narrower at apex than at base, widest behind middle; sides obliquely diverging from apical angles to middles, strongly, arcuately expanded behind middles, strongly constricted near bases; disk moderately convex, narrowly, transversely grooved along anterior margin, broadly, transversely depressed along base, with a large, erect, conical tubercle (which is obtusely rounded at apex) on middle of disk; surface impunctate, clothed with a few inconspicuous, erect hairs. Scutellum transverse, deeply, longitudinally depressed at middle.

Elytra distinctly wider than pronotum behind middle; sides parallel from humeral angles to near apices, which are separately narrowly angulate; surface coarsely, densely punctate basally, the punctures becoming finer and sparser toward apices, sparsely clothed with short, inconspicuous, erect hairs, and each elytron ornamented with black as follows: A broad fascia at base with posterior margin angulate, and a broad fascia at middle with the anterior and posterior margins crenulate, the fasciae not quite reaching the lateral margin.

Abdomen beneath impunctate, with a few long, inconspicuous, erect hairs; last visible abdominal sternite broadly rounded at apex. Mesosternum and metasternum coarsely, shallowly punctate, more densely pubescent than abdomen. Prosternum glabrous, transversely rugose.

Length 11–12 mm., width. 3.5 mm.

Type locality.—Hamburg Farm, Costa Rica.

Type and paratype.—U.S.N.M. No. 57672.

Remarks.—Described from two females (one type). The type was collected at the type locality, July 19, 1925, by Ferdinand Nevermann, and the paratype was collected at Coronado, 1,400 to 1,500 meters, Costa Rica, May 15, 1925, by T. Assmann.

The paratype differs from the type in having the antennae paler and the elytra ornamented with a large triangular black spot at the humeral angles and a black diamond-shaped spot along the sutural margins behind the scutellum.

This species is closely allied to *Oxylymma lepida* Pascoe, but it differs from the description given for that species in having the top of the head entirely black, the pronotum armed with a large conical tubercle on the median part of the disk, the elytra with a broad black fascia at the base or a black diamond-shaped spot behind the scutellum, the tips of the elytra more obtusely angulated, the last two abdominal sternites yellow, and in not having the tips of the elytra black.

Genus OMMATA White

OMMATA (ECLIPTA) BREVIPENNIS Melzer

Ommata (Eclipta) brevipennis Melzer, Arch. Inst. Biol. São Paulo, vol. 5, pp. 217–218, pl. 15, figs. 9–10, 1934.

Three specimens (two males and one female) were received from Fritz Plaumann for identification. These are alike in coloration and agree with the description given by Melzer for the male of *brevipennis*. They were collected at Nova Teutonia, Santa Catharina, Brazil, during November 1936, by Mr. Plaumann.

Melzer described this species from a male from Paraguay, with which he associated a female from the Argentine Republic. This female differs from the male in having the thorax red and may be a variety of the typical form.

According to the generic classification given by Lacordaire (Genera des Coléoptères, vol. 8, p. 498, 1869) for the tribe Rhinotragini, *brevipennis* could easily be placed in the genus *Odontocera*, but Bates (Ann. Mag. Nat. Hist., ser. 4, vol. 11, p. 36, 1837) has restricted the use of the genus *Odontocera* for the species which have the vitreous spaces on the elytra.

OMMATA (ECLIPTA) BREVIPENNIS var. FULVIPES, new variety

This variety differs from the typical form of *brevipennis* Melzer in having the antennae dark brownish yellow, the elytra brownish black, and all the legs brownish yellow, except the dorsal surface of the tarsi, which are more or less blackish.

Length 17 mm., width 2.25 mm.

Type locality.—Nova Teutonia, Santa Catharina, Brazil.

Type.—U.S.N.M. No. 57673.

Remarks.—Described from a single female collected December 26, 1936, by Fritz Plaumann.

OMMATA (ECLIPTA) BREVIPENNIS var. SANGUINICOLLIS, new variety

This variety differs from the typical form of *brevipennis* Melzer in having the elytra and tibiae in part brownish black and the thorax varying from uniformly dark red to dark red with a small black space at base and along anterior margin of pronotum, rarely with the prothorax and median part of pronotum black.

Length 14 mm., width 2 mm.

Type locality.—Nova Teutonia, Santa Catharina, Brazil.

Type and paratypes.—U.S.N.M. No. 57674.

Remarks.—Described from eight females (one type) collected during December 1935 and October and November 1936 by Fritz Plaumann.

OMMATA (ECLIPTA) POECILA var. NIGRICORNIS, new variety

This variety differs from the typical form of *poecila* Bates as follows: Head and antennae black, the latter becoming brownish black toward apices, pronotum with two small, round, black spots arranged transversely on disk in front of middle, apical two-thirds of the elytra black, metasternum, except anterior margin, black, abdomen uniformly yellow, except last visible sternite, which is black, and all tibiae uniformly black.

Length 10 mm., width 2 mm.

Type locality.—Nova Teutonia, Santa Catharina, Brazil.

Type.—U.S.N.M. No. 57675.

Remarks.—Described from a single female collected December 5, 1936, by Fritz Plaumann.

OMMATA (ECLIPTA) POECILA var. MACULICOLLIS, new variety

This variety differs from the typical form of *poecila* Bates as follows: Antennae black, becoming brownish black toward apices, mandibles and anterior margin of head black, apical two-thirds of the elytra black, metasternum, except anterior margin, black, abdomen uniformly yellow, except last visible sternite, which is black, and the middle and posterior tibiae entirely black.

Length 9 mm., width 1.75 mm.

Type locality.—Nova Teutonia, Santa Catharina, Brazil.

Type.—U.S.N.M. No. 57676.

Remarks.—Described from a single female collected December 12, 1936, by Fritz Plaumann.

Genus ODONTOCERA Audinet-Serville

ODONTOCERA EXILIS, new species

Male.—Elongate, very slender, moderately shining, black, except posterior tarsi and a small spot at humeral angles, which are yellowish white, and the pale vitreous vitta on each elytron.

Head prolonged into a short snout, coarsely, sparsely, irregularly punctate on occiput, densely clothed behind clypeus with long, recumbent, silvery white hairs; eyes large, deeply emarginate, and nearly contiguous on front. Antenna slightly expanded toward apex, serrate from sixth segment; first segment robust, moderately clavate; segments 2 to 5 slender, cylindrical, the third twice as long as fourth.

Pronotum subcylindrical, distinctly longer than wide, subequal in width at base and apex, widest at middle; sides slightly, arcuately rounded; disk moderately convex, broadly, shallowly, transversely depressed along base and anterior margin; surface coarsely, irregularly punctate on median part, more densely, finely punctate along sides

and anterior margin, sparsely clothed with rather long, inconspicuous, erect, silvery white hairs. Scutellum densely clothed with recumbent, white hairs.

Elytra at base as wide as pronotum at middle, extending to middle of second abdominal sternite, slightly dehiscent along sutural margins, and broadly rounded at apices; surface glabrous, coarsely, densely punctate along lateral margins, sparsely, indistinctly punctate on vitreous areas.

Abdomen very long, slender, and cylindrical, twice as long as rest of body; beneath sparsely, finely punctate, sparsely clothed with short, erect, black hairs, the last visible sternite flattened and more densely pubescent. Prosternum, mesosternum, and metasternum rather densely clothed with long, erect, white hairs and with patches of dense, recumbent, silvery-white pubescence. Posterior legs long and slender; femora abruptly clavate at apices, the posterior pair extending to the middle of third abdominal sternite.

Length 19 mm., width 2 mm.

Type locality.—Tela, Honduras.

Type.—U.S.N.M. No. 57677.

Remarks.—Described from a single male collected April 25, 1923, by S. C. Bruner.

This species can be distinguished from the other described species of this genus by its very long and cylindrical abdomen.

ODONTOCERA AUROCINCTA var. NIGROAPICALIS, new variety

This variety differs from the typical form of *aurocincta* Bates as follows: Intervals between the coarse punctures on the front of head finely and densely punctate, pubescence on pronotum, scutellum, and sternum silvery white, pronotum widest at the middle, with the sides regularly rounded, and the apical halves of the middle and posterior femora black.

Length 19 mm., width 2.5 mm.

Type locality.—"La Gloria, Cardel, V. C., Mexico."

Type.—U.S.N.M. No. 57678.

Remarks.—Described from a single female collected during July 1937 by J. Camelo G.

Genus ISCHASIA Thomson

ISCHASIA EXIGUA, new species

Male.—Elongate, strongly flattened above, subopaque; head, pronotum, scutellum, and body beneath black; antennae and legs brownish yellow, except posterior femora, which are yellowish white at bases.

Head without a distinct snout, coarsely, deeply, confluently punctate on occiput, sparsely clothed with short, inconspicuous, erect hairs; eyes large, deeply emarginate, contiguous on the front. Antenna ex-

tending to second abdominal sternite, abruptly expanded toward apex; segment 1 robust, slightly expanded toward apex, subequal in length to third segment; segments 2 to 6 slender, cylindrical, the third one-fourth longer than fourth; segments 7 and 8 elongate-triangular; segments 9 to 11 robust, cylindrical, the eleventh acute at apex.

Pronotum cylindrical, distinctly longer than wide, subequal in width at base and apex, widest at middle; sides slightly arcuately rounded; disk strongly convex; surface coarsely, deeply, confluently ocellate-punctate, sparsely clothed with long, inconspicuous, erect hairs. Scutellum rather densely clothed with recumbent, whitish hairs.

Elytra cuneiform, extending to middle of first abdominal sternite, at base slightly wider than pronotum at middle, strongly dehiscent along sutural margins, the tips narrowly rounded; surface rather sparsely, coarsely, shallowly punctate, sparsely clothed with rather long, inconspicuous, erect hairs.

Abdomen beneath indistinctly punctate, sparsely clothed on median part with long, erect, white hairs and along sides densely clothed with short, recumbent, white hairs. Posterior legs very long and slender; femora abruptly clavate; tibiae gradually expanded and densely clothed with semierect, stiff hairs toward apices, but the hairs not forming tufts.

Length 5 mm., width 1 mm.

Type locality.—Guatira Valley, El Marquez, Venezuela.

Type.—U.S.N.M. No. 57679.

Remarks.—Described from a single male collected June 19, 1926, by H. E. Box.

This species is allied to *Ischasia crassitarsis* Gounelle, but it differs from the description given for that species in having the eyes contiguous on the front of the head, the sides of the pronotum more parallel, the head and the pronotum black, the elytra brownish yellow, and the posterior tibiae densely clothed with rather stiff hairs toward their apices, but the hairs not forming tufts.

ISCHASIA NEVERMANNI, new species

Female.—Elongate, strongly flattened above, moderately shining, brownish yellow, except head, antennae, middle and posterior tibiae, outer surface of anterior tibiae, and tarsi, which are brownish or reddish black.

Head with a short snout, coarsely, sparsely, irregularly punctate, longitudinally rugose, sparsely clothed with short, erect, inconspicuous hairs, and with a shallow, longitudinal groove between the eyes; eyes large, deeply emarginate, separated from each other on the front by about one-half the width of lower lobe. Antenna extending to second abdominal sternite, strongly expanded toward apex; seg-

ment 1 robust, slightly expanded toward apex, three-fourths as long as third; segments 2 to 5 slender, cylindrical, the third twice as long as fourth; segments 6 to 11 slightly serrate, diminishing in length to the eleventh, which is acute at apex.

Pronotum cylindrical, distinctly longer than wide, subequal in width at base and apex, widest just behind middle; sides arcuately rounded, more obliquely converging anteriorly; disk strongly convex and slightly uneven; surface coarsely, deeply, confluently ocellate-punctate, sparsely clothed with short, semierect, inconspicuous hairs. Scutellum densely clothed with short, recumbent, yellowish hairs.

Elytra cuneiform, extending to middle of first abdominal sternite, at base subequal in width to pronotum behind middle, strongly dehiscent along sutural margins at apical halves, the tips narrowly rounded; surface coarsely, rather densely, uniformly punctate, sparsely clothed with long, erect, yellowish hairs.

Abdomen beneath indistinctly punctate, sparsely clothed with long and short, erect, inconspicuous hairs. Posterior legs long and slender; femora abruptly clavate at apices and extending to tip of abdomen; tibia slender, cylindrical, not expanded toward apex, uniformly clothed with short, semierect, stiff hairs, but the hairs not forming tufts toward apices.

Length 10 mm. width 1.75 mm.

Type locality.—Hamburg Farm, Costa Rica.

Type.—U.S.N.M. No. 57680.

Remarks.—Described from a single female collected at night on a freshly cut sapotaceous tree, January 3, 1937, by Ferdinand Nevermann.

This species is allied to *Ischasia crassitarsis* Gounelle, but it differs from the description given for that species in having the pronotum, elytra, and underside of the body brownish yellow, the dorsal surface of the pronotum slightly uneven, the elytra cuneiform and more strongly dehiscent posteriorly, and in not having the posterior tibiae expanded toward their apices.

Genus EPIMELITTA Bates

EPIMELITTA ACUTIPENNIS, new species

Male.—Short and rather robust, strongly flattened above.

Head prolonged into a short snout, black, except clypeus, labrum, and mandibles, which are brownish yellow; surface densely, coarsely punctate on occiput, with a deep, longitudinal groove between the eyes, rather densely clothed with long, recumbent, pale yellow hairs; eyes large, deeply emarginate, separated from each other on the front by about the diameter of first antennal segment. Antenna short, slightly expanded toward apex, pale yellowish brown and strongly shining at base, becoming opaque and dark brown toward apex; segment 1 robust,

slightly expanded toward apex, subequal in length to third segment; segments 2 to 4 slender, cylindrical, the third twice as long as fourth; segments 5 to 11 subtriangular or subcylindrical.

Pronotum black, one-third wider than long, wider at apex than at base, widest at basal third; sides slightly, arcuately diverging from anterior angles to basal thirds, then strongly constricted near bases; disk slightly uneven, transversely depressed along base; surface coarsely, deeply, confluently punctate, densely, irregularly clothed with long, erect and recumbent, yellow hairs. Scutellum densely clothed with yellow hairs.

Elytra cuneiform, extending to middle of first abdominal sternite, acute at apices, pale brownish yellow, each with a triangular black space at scutellum, and a small black spot at middle along lateral margin; surface rather coarsely punctate basally, the punctures becoming finer and sparser toward apices, and each elytron with a longitudinal spot of long, erect, brownish-yellow hairs extending from base to middle of sutural margin.

Abdomen beneath brownish yellow, with margins blackish, densely, shallowly punctate, sparsely clothed with short, erect, yellowish hairs; first visible sternite ornamented on each side with a narrow fascia of white hairs; last visible sternite broadly, arcuately emarginate at apex. Sternum black, densely, irregularly clothed with long, erect and recumbent, yellow and white hairs. Legs brownish yellow, except apical halves of posterior femora and tibiae, which are black; anterior and middle legs rather densely clothed with moderately long, yellow hairs, posterior femora extending to apical margin of third abdominal sternite, very coarsely, deeply, densely punctate, rather densely clothed with short, semierect, yellowish hairs, with a narrow fascia of white hairs near apices; posterior tibiae coarsely, confluently punctate, clothed with long, erect, yellow hairs, and with a dense tuft of dark brown hairs near apices.

Female.—Differs from the male in having the eyes separated from each other on the front by about three times the diameter of the first antennal segment, the pronotum broadly yellow along base and anterior margin, the last visible abdominal sternite truncate at the apex, and the first visible abdominal sternite with a narrow fascia of white hairs along the posterior margin.

Length 13.5 mm., width 3.5 mm.

Type locality.—British Guiana.

Type and allotype.—U.S.N.M. No. 57681.

Remarks.—Described from a male and female (male type) collected at the type locality.

This species is allied to *Epimelitta nigerrima* Bates but can be separated from that species by its yellowish-brown color and by having the tips of the elytron more acute and indistinctly punctate.

EPIMELITTA NIGERRIMA var. FLAVIPUBESCENS, new variety

This variety differs from the typical form of *nigerrima* Bates as follows: Dark reddish brown, posterior tarsi and apical halves of posterior femora and tibiae reddish yellow, and the posterior tibiae with a dense tuft of long, yellow hairs covering the greater part of the tibiae.

Lenth 14 mm., width 3.5 mm.

Type locality.—LaCaja (near San José), Costa Rica.

Type.—U.S.N.M. No. 57682.

Remarks.—Described from a single female collected during December 1929 by H. Schmidt.

Genus TOMOPTERUS Audinet-Serville

TOMOPTERUS FLAVOFASCIATUS, new species

Female.—Form similar to *Tomopterus quadratipennis* Bates. Head prolonged into a short snout, black except labrum, which is brownish yellow; surface densely, coarsely punctate on occiput and behind labrum, with a rather broad, longitudinal groove between the eyes, rather densely clothed with recumbent, yellowish hairs; eyes large, deeply emarginate, and separated from each other on the front by about twice the diameter of the first antennal segment. Antenna brownish yellow, subopaque, gradually expanded toward apex; segment 1 robust, slightly expanded toward apex; segments 2 to 4 cylindrical, the third twice as long as fourth; the following segments subequal in length, robust, and subcylindrical or subtriangular.

Pronotum black, quadrate, subequal in width at base and apex, widest in front of middle; sides arcuately rounded in front of middle, slightly, obliquely converging posteriorly; disk strongly convex, narrowly, transversely depressed along base and anterior margin; surface coarsely, deeply, confluently ocellate-punctate, sparsely clothed with inconspicuous, erect hairs and ornamented with short, recumbent, yellow pubescence as follows: A narrow fascia along base and anterior margin, and a narrow, arcuate, median fascia, extending to lateral margins at middle. Scutellum very large, elongate, coarsely punctate, densely clothed at apex with recumbent, yellowish pubescence.

Elytra very short, not extending to base of abdomen, the tips broadly rounded exteriorly and more or less obliquely toward sutural margins, black, and each elytron with a narrow, oblique brownish-yellow vitta (color paler posteriorly) extending from humeral region to apex at middle, and a triangular brownish-yellow spot at scutellum; surface coarsely, deeply, confluently ocellate-punctate, and sparsely clothed with short, inconspicuous, erect hairs.

Abdomen beneath brownish black, finely, densely punctate and granulose, densely clothed with short, recumbent, whitish hairs, which

are slightly longer along posterior margins of sternites. Metasternal epimeron densely clothed with recumbent, yellow pubescence. Legs reddish brown, except bases of posterior femora, which are whitish.

Length 10 mm., width 2.75 mm.

Type locality.—Nova Teutonia, Santa Catharina, Brazil.

Type.—U.S.N.M. No. 57683.

Remarks.—Described from a single female collected December 18, 1936, by Fritz Plaumann.

This species is allied to *Tomopterus quadraticollis* Bates, but it differs from that species in having a narrow, arcuately median fascia of yellow pubescence on the pronotum, and a large, triangular, brownish-yellow spot on each elytron at the scutellar region.

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STUDIES ON THE FIREFLY, IV: TEN NEW LAMPYRIDS FROM JAMAICA

By JOHN B. BUCK

BARBER'S (1941) key to the lampyrid fireflies of Jamaica contains brief descriptions of 38 new species and subspecies, mainly from my 1936 collection. The purpose of the present paper is to describe 10 additional species that were recognized in a much more extensive collection made in July and August 1941.[1] Mr. Barber and I have in preparation a monograph that will include all previously published information on Jamaican fireflies, a revised key, and extensive data on the habits and distributions of the forms considered. We regard this latter type of information of very great importance for an adequate understanding of a lampyrid fauna.

MATERIAL, METHODS, AND TERMINOLOGY

The descriptions were made from dried and mounted specimens, although I tried to include as many characters as possible that can be seen in fresh samples or with a minimum of microscopical observation. In many instances, however, a positive identification cannot be made without careful microscopical study of certain basic anatomical features, and for this a brilliant spotlight and a binocular dissecting microscope with magnification up to 50 diameters are necessary. As emphasized by Barber (1941), the mode of preservation of fresh

[1] It is a pleasure to acknowledge my indebtedness to Dr. P. J. Darlington, Jr., for the loan of the Museum of Comparative Zoology collection; to Miss Idolene Hegemann, of Bennington College, who made most of the aedeagus drawings; and to Dr. d'Alte Welch for lending the pocket aneroid barometer used for the altitude measurements. The expenses of the trip were met in part by a grant from the Penrose Fund of the American Philosophical Society. The expedition based at Clydesdale House in the Blue Mountains, for the use of which we are greatly indebted to the Natural History Society of Jamaica, to the Jamaica Department of Forestry, and particularly to C. Bernard Lewis, curator of the Science Museum of the Institute of Jamaica, who worked tirelessly to make our stay in Jamaica as profitable as possible. Finally, I want to thank especially H. S. Barber, who has given me unstinted guidance and encouragement in all aspects of the work. This study was made in the Department of Zoology, University of Rochester, Rochester, N. Y.

samples is of vital importance in obtaining specimens suitable for adequate study. All the descriptions presented below, except that of *Diphotus darlingtoni*, are based on specimens prepared by the following technique, which produces samples far superior to ordinary pinned material in cleanness, flexibility, and preservation of natural form and color: Place the specimen alive in at least 10 volumes of 70 percent alcohol and leave for several days or longer; extend the abdomen and hook out the aedeagus with a bent-tipped micropin so that both surfaces are fully displayed (if it becomes detached, cement on a hair and mount with the specimen); place in 95 percent alcohol, one hour; absolute alcohol (2 changes), overnight to several days; benzene, 10 minutes; allow to dry on porous tile or filter paper; mount on point with cellulose acetate cement diluted with amyl acetate.

The male has been used as the basis of classification since males are almost always very much more abundant in collections than females (perhaps because it is usually only the male that flies and flashes spontaneously), and because when several species are active at the same time and place, females cannot always be associated with males of the same species. Following Barber (1941) particular weight has been given to the morphology of the male copulatory apparatus (aedeagus). In most cases this evidence merely confirms conclusions that are indicated by habitus and other morphological evidence, but occasionally it is particularly valuable in suggesting affinities not otherwise obvious and, conversely, in separating forms superficially very similar. However, a statistical analysis of aedeagal dimensions in populations of four "subspecies" of *Photinus evanescens* Barber (Buck, 1942) shows that the aedeagus is no less variable in form than most other structures and indicates that too much importance should not be attached to minor variations in contour.

In most instances I have followed the terminology of Torre-Bueno (1937). For the aedeagus I use, like Barber (1941), the standard notation of Sharp and Muir (1912), as follows (using *Photinus lewisi*, pl. 2, fig. 11, as an example): The aedeagus consists of two *lateral lobes* (*LL*), which lie on each side of and may partly enclose the single *median lobe* (*ML*). The lateral lobes are typically heavily sclerotized, except perhaps at their extreme tips, and are rigid, though jointed at their basal ends (anteriorly) and movable in life by means of complex muscles within the *basal piece* (*B*) of the aedeagus. The lateral lobes accordingly may be found spread apart laterally to different degrees in different specimens. The median lobe is usually sclerotized dorsally and laterally, membranous ventrally. The function of the lateral lobes is thought to be to spread the female aperture and guide into it the tubelike *internal sac* (pl. 2, fig. 12a, *IS*), which during mating emerges from the tip of the median lobe. Actually, the internal sac is rarely

seen extruded. On both lateral and median lobes accessory structures such as hooks, knobs, and teeth may be present. By "length of lateral lobe" is meant the distance from its apex (posterior end) to the nearest part of the basal piece.

It is difficult to make generic generalizations concerning the aedeagus, but *Photinus* seems to differ from *Diphotus* in having lateral lobes that in dorsal aspect are close together only in their basal third or less and are usually widely separated distally except at their apices, which curve evenly close together. In *Diphotus*, on the other hand, the lateral lobes are generally rather straight-sided in both margins and are usually close to each other dorsally throughout most of their lengths. In *Photinus* the functional orifice of the median lobe is dorsal; in *Diphotus* it is ventral.

All the drawings of aedeagi were made under a 16-mm. objective with a camera lucida at magnifications of 130 to 200 diameters. Reproduced sizes can be judged from the ½-millimeter scale lines included with each set of drawings.

In regard to color I use "white" to include also very pale gray or very light yellow (in contrast to "light brown," implying straw, pale tan, or khaki), and "black" to include also very dark brown (in distinction to "dark brown," which I use to include chocolate, rich brown, or sepia).

Properties of the chitinous surface are described with considerable reservation because the decisions as to whether a surface is studded with minute elevations or with minute depressions, or whether it is glossy or dull, often rests solely on the type of illumination used and is further obscured by the degree of pubescence of the surface, which is itself difficult to determine and describe accurately.

Length measurements always precede width. Length of the insect as a whole is always given as from the apex of the pronotum to the apices of the elytra and is ordinarily obtained by measuring pronotum and elytra separately, then adding, because the body is often flexed at the promesothoracic joint in pinned specimens.

The terms "sternites" and "tergites" as used herein refer always to the abdomen. In the Lampyridae the first sternite is vestigial or obsolete, sternite 2 being the first visible. In the male, sternite 9 is reduced in size and hidden beneath tergite 8, the pygidium, forming part of the sheath of the aedeagus. Likewise tergites 9 and 10 are reduced, fused, and usually hidden under the pygidium as part of the aedeagal sheath.

Head and eye dimensions were measured at 40 diameters with a micrometer ocular, the eye in the anteroposterior axis (though firefly eyes are nearly always round in lateral aspect) and the head from the front (i. e., the greatest distance from the most lateral surface of one

eye to that of the other). The degree of divergence of the anterior inner margins of the eyes, dorsal to the antennal sockets a distance about equal to the radius of the eye, was found to be a useful character. The frons was measured at the level of the antennae. The frons is often much hollowed, the concavity being, in the forms here studied, a measure of the relative size of the eyes to the head as a whole, as is usually also the degree of divergence of the interocular margins (which is in general greater, the smaller the eyes). The reader should recall that the size of the eyes in most male fireflies greatly exceeds that in the female, so that the frons usually differs markedly in shape in the two sexes.

A valuable key character, used also by Barber, is the coloration of the two small, polygonal, basolateral mesonotal plates (pl. 3, fig. 21, *MP*) situated anterolaterally to the scutellum (*SC*) in the space between the pronotum (*PR*) and the articulations of the elytra (*EL*) and usually partly covered by the hind margin of the former.

In *Photuris*, *Photinus*, and *Presbyolampis* there often occurs one or two robust conical sclerotized elongated spurs, movable in fresh material, which originate in the tarsal socket behind and project distally beyond the ventral surface of the distal end or rim of the tibia (pl. 2, fig. 16). These spurs, which are to be distinguished from those occurring in *Diphotus* and *Microdiphot* (pl. 2, figs. 17–19) described below, are prominent in some species of *Photinus*, but in others they are so inconspicuous as to require exhaustive microscopical search. The spurs were studied carefully in all species where a large series was available, particularly in *Photinus pallens* (Fabricius, 1798) and *Photuris jamaicensis* E. Olivier, 1886, where they are very prominent, and their distribution was found to be absolutely constant intraspecifically not only as to over-all pattern but also as to position of the individual spurs. Moreover, male and female were found to show the same pattern. I feel therefore that the distributional pattern of tibial spurs, since it differs in different species, is a useful specific character. However, it must be confessed that in species which are very small or in which the spurs are difficult to distinguish from ordinary hairs because of similar coloration (e. g., *P. lewisi*) there occasionally appear to be discrepancies in distribution both between different individuals and between the two legs of a pair.

The shapes of the maxillary and labial palps are quite distinctive and could probably be used as specific characters, but for lack of space for illustrations I have used only their coloration. The terminal segment of the larger maxillary palp is usually subconical with one side produced to an edge, whereas that of the labial palp varies in shape from rectangular (e. g., in *Photinus nothoides*) through triangular or hastate (e. g., *P. elisabethae*) to mitten-shaped (*Diphotus masti*).

A short mention ("Field Characters") of certain prominent characteristics heads each description. This is intended only as an aid to preliminary identification, not as a key or diagnosis.

The numbers following the individual descriptions refer, unless otherwise noted, to the U. S. National Museum collection, where the specimens are deposited.

LOCALITIES

Studies on intra- and interspecific relationships, such as the work on *Photinus evanescens* Barber (1941) already mentioned (Buck, 1942), require precise knowledge of geographical distribution. Since most of the localities visited in 1941 were in very inaccessible semiwilderness regions, a brief description of each, alphabetically arranged, is included. Some of the mentioned place names refer to those on the map of Jamaica prepared by the Public Works Department and issued by the Jamaica Automobile Association, but the names of some of the more obscure localities can be found only on manuscript maps in the Institute of Jamaica. The name in parentheses after the place name is that of the parish. For a better understanding of the geography of the high peaks of the Blue Mountain Range, where much of the collecting was done, it should be stated that the main ridge runs roughly west-east, with John Crow (6,000 feet), Bellevue (6,000 feet ?), Sir Johns (6,100 feet), High (6,300 feet ?), Mossmans (6,600 feet), and Blue Mountain (7,360 feet) Peaks in sequence.

Belmore Castle (Trelawny): In the southern Cockpit Country at the end of automobile transportation on the road leading north from Golden Grove (St. Elizabeth), and about 19 airline miles northwest of Mandeville. Collections were made along the forest trail running north toward interior banana plantings, and also around the ranger station at Quickstep, one mile to the south. Altitude about 1,500 feet.

Catherines Peak (St. Andrew): 5,050 feet, southern outlier of main Blue Mountain Range, about 2½ airline miles east-southeast of Hardware Gap and 11 airline miles northeast of Kingston. Collected trail from Woodcutters Gap (4,500 feet) to summit.

Chestervale (St. Andrew): Coffee plantation in foothills of John Crow Peak, near junction of Yallas and Clyde Rivers about 2 airline miles east-northeast of Catherines Peak. Altitude 3,200 feet.

Clydesdale (St. Andrew): Abandoned coffee plantation near the headwaters of the Clyde, 1 airline mile east of Chestervale with which it is connected by 2 miles of excellent rain-forest trail, much used for collecting. Altitude 3,500 feet.

Cornpuss Gap (St. Thomas): Collected along trail leading up east side of the east fork of the Island River Valley starting about 3 trail (2 airline) miles north of Bath, at 1,650 feet at point 0.8 trail mile north of United Fruit Co. shed at Barretts Gap, and continuing up 2 miles through banana plantings to forest reserve at about 1,975 feet.

Morces Gap (Portland–St. Andrew): Between John Crow Peak on the west and Bellevue Peak on the east. Altitude 4,950 feet.

Mossmans Peak (Portland): Collected for 2 miles along the level forest trail leading from Portland Gap west around the north shoulder of the peak, at 5,600 feet.

New Haven Gap (Portland–St. Andrew): Between Bellvue and Sir Johns Peaks. Altitude 5,500 feet.

Port Antonio (Portland): Port on north coast near east end of island.

Sir Johns Peak (St. Andrew): Collected trail leading around south shoulder of peak from saddle (5,750 feet) between Sir Johns and High Peaks through tree fern forest (5,900 feet) and down toward New Haven Gap.

Stony Hill (St. Andrew): 8 airline miles due north of Kingston. Altitude 1,150 feet.

Trafalgar Gap Trail (Portland): Leads north from Morces Gap (4,950 feet), descending gradually to 4,350 feet in about 2 miles.

DESCRIPTIONS OF NEW SPECIES AND GENERA

Genus PHOTINUS Motschulsky

A redescription of the genus *Photinus* would be out of place here, but a few words about certain characteristics common to all the species here described and, in most cases, different from those of the other genera considered, will save duplication in the individual descriptions.

In the males of the known Jamaican species of the genus (except *Photinus lucernula* Barber) the photogenic organs of the adult occupy all the ventral surfaces of abdominal segments 6 and 7 (pl. 3, fig. 32), whereas in the female (pl. 3, fig. 33) there is only one organ, occupying part of sternite 6. The photogenic organ, which is usually white or, in life, very pale yellow and is surrounded by a very narrow chalky border formed by the edge of the "reflector" layer of the organ, should not be confused with white sternites due merely to absence of pigmentation. In most species of *Photinus*, in contrast to *Diphotus*, sternites 6, 7, and 8 have a rounded notch, sometimes quite deep, in the middle of the posterior margins, giving a more or less bilobed effect (pl. 3, fig. 32). As in *Diphotus* the tarsal claws are simple (pl. 3, fig. 29). The tibial spur pattern is usually 0–1–1 or 1–2–2. Aedeagal characters have already been mentioned.

PHOTINUS LEWISI, new species

PLATE 1, FIGURE 1; PLATE 2, FIGURE 11

Field characters.—Dimensions varying from 6.5 by 2.4 to 8.1 by 3.0 mm. (Average dimensions, with standard errors, 7.4 ± 0.5 mm. by 2.7 ± 0.2 mm.) Pronotum and end of abdomen nearly white, rest of body dark brown to black.

Male.—Pronotum averaging 1.5 mm. long by 2.2 mm. wide (though length-width ratio varies from 2:3 to nearly 1:1); shape and proportions variable; sometimes widest before hind angles, front margin usually semicircular, hind angles usually produced backward slightly, basal margin straight in median three-fifths; color entirely white or

with an indefinite and variable brown discal spot, shining. Scutellum and mesonotal plates dark brown. Elytron about 6.2 by 1.3 mm.; uniform dark brown to black; margins subparallel to apical fourth, thence tapering mainly in lateral margin. Head width 1.2 mm. Eye length 0.65 mm. Frons width 0.38 mm., black, slightly concave; interocular margins very slightly divergent. Maxillary palpi medium to dark brown, labial palpi light brown. Antennae 3.1 mm., dark brown, segments 6 to 8 each three times as long as wide. Legs and ventral surface of thorax dark brown. Claws light to medium brown. Tibial spurs short and very difficult to see, distributed usually front leg 1, middle leg 2, hind leg 2, but a few individuals apparently have only one on the hind tibiae. Tergites 1 to 7 dark brown; pygidium white, broad with slight median sagittal ridge, shape variable, hind margin more or less bisinuate and with median angle of variable length and sharpness, sometimes flanked by less prominent lateral angles. Sternites 2, 3, 4, and most of 5 dark brown, the latter with most of hind margin white, 6 to 9 white; 6 very slightly, 7 and 8 fairly strongly and broadly notched at centers of hind margins. Aedeagus (pl. 2, figs. 11, *a–c*) similar to that of *P. evanescens* Barber; white; lateral lobes parallel-sided in basal third, then tapering rapidly, cylindrical and curving evenly nearly to contact at apices, which are slightly knobbed and curved slightly posterodorsally; median lobe moderately broad, nearly covered basally (anteriorly) on dorsal surface by the internally hollowed overlapping basal regions of the lateral lobes, its sclerotized covering light brown dorsally, dark brown and rough laterally at apex, notched deeply on dorsal surface and reaching only to apical fourth of lateral lobes; ventrally the sclerotized shell of the median lobe covers only its lateral surfaces and is slightly expanded near its base.

Female.—Fully winged and very similar to male. Pygidium white; wider than long, the sides strongly arcuate in basal half, thence straight and strongly convergent to the truncate apex; rest of tergites dark brown. Photogenic organ in median third of sixth abdominal sternite, other sternites colored as in male.

Type and paratypes.—U.S.N.M. No. 57315.

Distribution.—Sir Johns Peak (type locality), August 2, 1941, type male and ten male and one female paratypes; Trafalgar Gap trail, July 21, 1941, 1 male paratype; Catherines Peak, July 28, 1941, 3 male paratypes; New Haven Gap, August 2, 1941, 1 male paratype; Mossmans Peak, July 30, 1941, 1 male paratype. Known altitude range, 4,975–5,750 feet.

Named for C. Bernard Lewis, curator of the Science Museum, Institute of Jamaica, in appreciation of his many favors to the expedition.

PHOTINUS PARDALIS, new species

PLATE 1, FIGURE 2; PLATE 2, FIGURE 12

Field characters.—Length 6.5–7.0 mm., width 2.5 mm. Pronotum uniform white; elytra light brown with many small, irregularly distributed, sometimes confluent, diffuse dark brown spots.

Male.—Pronotum 1.3 by 1.9, 1.6 by 2.2, and 1.6 by 2.2 mm. in the three known males; front margin semicircular, lateral margins at hind angles varying from parallel to definitely convergent anteriorly; color uniform white, including disc, but with translucent area over eyes; hind margin nearly straight; hind angles prolonged slightly backward. Scutellum dark brown. Mesonotal plates usually light brown. Elytron averaging 5.4 by 1.2 mm.; light brown with about 30 small irregular diffuse, sometimes confluent, dark brown spots; dull; darker at humerus; nearly parallel-sided to apical fourth, then tapering mainly in lateral margin; vestiture pale. Head width 1.3 mm. Eye length 0.7 mm. Frons width 0.37 mm., black, slightly concave; interocular margins parallel. Maxillary palpi dark brown labial palpi light brown. Antennae 3.0 mm., dark brown, segments 6 to 8 each once and a half to twice as long as wide. Legs and ventral surface of thorax dark brown; claws light brown; tibial spurs very pale and inconspicuous, distributed front leg 1, middle leg 2, hind leg 2. Tergites 1 to 4 light brown, 5 to 8 white; pygidium broad and bulbously ogival, widest at basal third, hind margin produced centrally to blunt point. Sternites 2 to 4 dark brown, 5 to 9 white; 6 slightly, 7 and 8 abruptly notched in center of hind margins; sternites project laterally considerably beyond corresponding tergites. Aedeagus (pl. 2, figs. 12, *a-c*) nearly identical with that of *P. lewisi* but with two differences: the lateral surfaces of the tip of the median lobe and the internal surfaces of the tips of the lateral lobes are toothed, and the ventrobasal sclerotized margins of the median lobe are expanded into small knobs.

Female.—Fully winged; 8.4 by 3.5 mm.; more oval than male. Anterior margin of pronotum slightly blunter than in male, 1.9 by 2.8 mm., lateral margins parallel in basal half, basal margin straight. Elytron 6.5 by 1.8 mm.; antennae 3.0 mm. Coloration as in male except that sternite 5 is partly white. Photogenic organ in median half of sternite 6.

Type and paratypes.—U.S.N.M. No. 57317.

Distribution.—Belmore Castle, August 9, 1941, type male and 1 female paratype; Stony Hill, August 18, 1941, 1 male paratype; half a mile east of Stony Hill, February 10, 1937 (E. A. Chapin, collector), 1 male paratype.

Named for its spotted elytra, unique among known Jamaican lampyrid fireflies.

PHOTINUS NOTHOIDES, new species

PLATE 1, FIGURE 3; PLATE 2, FIGURE 14

Field characters.—Length 5.5, width 1.8 mm. Pronotum and elytra dark brown with white borders, which coincide in the humeral region to give the impression, not well shown in the photograph, of a continuous border around body.

Male.—Pronotum 1.0 by 1.5 mm.; approximately semicircular in front, side margins straight and slightly convergent apically in basal third, hind margin slightly emarginate, hind angles acute; disc marked in basal half with a large, approximately rectangular, homogeneous, dark brown spot, which is produced slightly in the middle of its anterior margin and surrounded on side and front margins by a white border of about one-sixth pronotal width. Scutellum and mesonotal plates dark brown. Elytron 4.5 by 0.9 mm.; widest at basal sixth, tapering slightly to apical fifth, thence more sharply in both margins to rounded apex; dark brown (darkest at humerus) with lateral white border of about one-fifth elytral width extending to apical sixth, no sutural border. Head width 0.9 mm. Eye length 0.5 mm. Frons width 0.37 mm., dark brown at antennae, black above; slightly concave; interocular margins very divergent (about 30°). Maxillary and labial palpi light to medium brown. Antennae 1.7 mm., basal two segments medium brown, rest dark brown, segments 6 to 8 each between once and a half and twice as long as wide. Ventral surface of thorax dark brown; all coxae and femora and the entire hind leg white, tibiae and tarsi of front and middle legs medium brown; claws white; no tibial spurs visible (too small?). Tergites medium to dark brown; pygidium damaged. Sternites 2 to 4 dark brown, 5 partly darkened anteriorly, 6 to 9 white; 5 sinuate, 6 to 8 strongly notched in middle of hind margins. Aedeagus (pl. 2, fig. 14, *a-c*): lateral lobes white, laterally flattened and internally hollowed basally, truncated apically to sharp posteroventrally directed tips which curve evenly to contact with each other; dorsal internal margins of lateral lobes well separated and with three scallops; median lobe dorsoventrally flattened, expanded to a pair of lateral teeth at about half, then curving steeply dorsoposteriorly to project between the lateral lobes and end dorsal to their apices in a sharp point; infuscate dorsal covering of median lobe medium brown in middle third, otherwise white; median lobe almost entirely membranous ventrally.

Type.—U.S.N.M. No. 57318.

Distribution.—Catherines Peak, July 25, 1941, type male. Named for its superficial similarity to *Photinus nothus* Barber.

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PHOTINUS HARVEYI, new species

PLATE 1, FIGURE 4; PLATE 2, FIGURE 13

Field characters.—Dimensions 4.4 by 1.7 and 4.6 by 1.9 mm. in the two known males. Pronotum semicircular in front margin, white with yellow disc. Elytra considerably broader than pronotum, medium brown with broad lateral and narrow sutural white borders.

Male.—Pronotum 0.9 by 1.3 mm.; front margin semicircular, hind margin straight or slightly emarginate, hind angles slightly acute; disc pale yellow or orange, lighter along side and front margins. Scutellum dark brown. Mesonotal plates light brown. Elytron about 3.6 by 0.9 mm.; nearly parallel-sided to apical fourth where taper begins in both margins; medium brown, lateral border white and about one-fifth elytral width, sutural border white and very narrow; vestiture light, fine, and fairly sparse. Head width 0.83 mm. Eye length 0.5 mm. Frons width 0.27 mm., black, slightly concave; interocular margins slightly divergent. Maxillary palpi medium brown; labial palpi white. Antennae 1.4 mm.; dark brown; segments 6 to 8 each about twice as long as wide. Legs and ventral surface of thorax dark brown; claws light brown; tibial region too small to ascertain spur condition. Tergites 1 to 5 light to medium brown, 6 to 8 white; pygidium ogival, 0.21 by 0.24 mm. Sternites 2 to 4 dark brown, 5 partly infuscate basolaterally, 6 to 9 white; 6 slightly, 7 and 8 moderately notched at centers of hind margins. Aedeagus (pl. 2, fig. 13, *a–c*) white except for a slight preapical infuscation of the inner surfaces of the lateral lobes and a strong apical infuscation of the median lobe; lateral lobes slender, flattened laterally, widely separated from median lobe except at apices, evenly curved, tips slightly expanded dorsally and tilted inward at about 45° so as to overlap slightly the tip of the median lobe, toothed along inner surfaces in apical half; median lobe slender, covered dorsally by an apically black sclerotized plate, which extends posteriorly nearly to apices of lateral lobes and is there expanded laterally in a pair of teeth; ventrobasal part of sclerotized sheath of median lobe expanded laterally into small knobs.

Type and paratype.—U.S.N.M. No. 57320.

Distribution.—Morces Gap, July 16, 1941, type male; Catherines Peak, July 28, 1941, 1 male paratype.

Named for Prof. E. Newton Harvey, of Princeton University.

PHOTINUS ELISABETHAE, new species

PLATE 1, FIGURE 5; PLATE 2, FIGURE 15; PLATE 3, FIGURES 21, 32, 33

Field characters.—Length 8.0 to 8.5 mm., width about 3.1 mm. Pronotum yellow with dark brown disc. Elytra dark brown with conspicuous white lateral and sutural borders.

Male.—Pronotum about 1.8 by 2.3 mm.; variable in contour, the lateral margins sometimes subparallel in basal third, sometimes farthest apart at basal third; front margin usually approximately semicircular, but sometimes produced, slightly upturned and subangulate; basal margin straight except at hind angles, which are produced slightly backward (pl. 3, fig. 21); disc with central dark brown or black area of irregular shape and variable extent, usually one-half to one-fourth the pronotal width in diameter, and sometimes flanked also by more or less distinct longitudinal dark brown stripes of about the length of the disc and about one-fourth pronotal width in from the lateral margins of the pronotum; central part of disc with broad very shallow transverse depression; disc surrounded on sides and in front by broad, flat, yellow-brown border. Scutellum dark brown anteriorly, usually lighter toward its apex. Mesonotal plates dark brown or black. Elytron about 6.5 by 1.5 mm., dark brown, with lateral whitish border up to one-third elytral width and much narrower pale sutural border, the two vaguely confluent at apex; very slightly broader at basal third, main taper begins at apical fourth and in lateral margin only; vestiture fine, light, and inconspicuous. Head width about 1.45 mm. Eye length 0.9 mm. Frons width 0.48 mm., black, slightly concave; interocular margins slightly divergent. Maxillary palpi dark brown, labial palpi dark brown, pale at apices. Antennae 4.0 mm., dark brown, segments 6 to 8 each about three and one-half times as long as wide. Ventral surface of thorax, tibiae, and tarsi dark brown, rest of legs lighter; tibiae much flattened; claws light brown; tibial spurs light brown, small and so inconspicuous that their distribution cannot be specified with assurance, although where clear it is front 1, middle 2, hind 1. Tergites 6 to 8 white, rest infuscate in variable degree; pygidium in shape of broad abruptly truncated triangle, the hind margin being nearly straight (occasionally feebly arcuate) and about two-thirds as wide as the basal margin. Sternites 2 to 4 dark brown, 5 usually so at least anteriorly, 6 to 9 white; 6 slightly, 7 and 8 markedly notched in centers of hind margins (pl. 3, fig. 32) and slightly narrower than corresponding sternites. Aedeagus (pl. 2, fig. 15, *a–c*) similar to that of *P. chapini* Barber; almost wholly white; lateral lobes white, laterally compressed, outer margins subparallel to apical third where they converge abruptly and narrow dorsoventrally to sharp points directed posteroventrally; inner margins subparallel and well separated in basal third, then divergent to apical third, thence convergent; median lobe moderately broad, dorsoventrally flattened, its dorsal sclerotized surface white basally, black apically, curving dorsally from deeply ventral level to top surfaces of lateral lobes, membranous portion projects dorsally therefrom to pointed apex; dorsal sclerotized surface of median lobe is incised at apex by

basally pointing V, and reaches to about the apical fifth of the lateral lobes; ventral surface of median lobe membranous.

Female.—Dimensions 7.5 to 9.0 mm. by about 3.2 mm. Very similar to male. Fully winged and capable of flight. Identification validated by pair taken mating. Sternites 2–6 dark brown except for light organ in median third or quarter of 6 (pl. 3, fig. 33); 7 occasionally, and 8 usually light brown; hind margins sinuate and sometimes very slightly notched in centers. Tergites all dark brown except for 7 and 8, which may be lighter. Head width 1.16 mm. Eye length 0.6 mm. Frons width 0.50 mm. Tibal spurs same as in male.

Type and paratypes.—U.S.N.M. No. 57316.

Distribution.—Catherines Peak (type locality), July 28, 1941, type male and three male and three female paratypes; June 21, 1936, one female paratype; and July 27, 1936, one female paratype; Mossmans Peak, July 31, 1941, one male and two female paratypes. One of the few species in which more females than males were found.

Named for my wife, Elisabeth Mast Buck, in appreciation of her constant and extensive assistance in the field and laboratory.

Genus DIPHOTUS Barber

The most conspicuous difference between *Diphotus* and *Photinus* is the restriction of the light organs, in both sexes of the former, to a pair of lateral spots in sternite 8, the usual position of the larval organs in most luminous lampyrids. These are usually small, as in *D. masti* (pl. 3, fig. 34), but occasionally, as in *D. semifuscus* Barber, they occupy nearly all the sternite. Other differences between *Diphotus* and *Photinus* are the presence, in the former, of pinkish or purplish color in some of the viscera, which may show externally through translucent regions such as the pronotal disc and abdomen, the presence of relatively straight posterior margins on the abdominal sternites (pl. 3, fig. 34), and of relatively larger eyes. In place of the one or two rather conical spurs projecting from just behind the distal rim of the tibia in *Photinus*, *Photuris*, and *Presbyolampis*, diphotids have an even close-set circlet of more slender spurs projecting distally from the extreme distal rim of the tibia (pl. 2, fig. 17). Strictly speaking these are probably modified hairs, rather than derivatives of the type of spur found in *Photinus*, *Photuris*, and *Presbyolampis*. In forms where they are darker than the leg vestiture (e. g., *D. montanus*, *mutschleri*, *semifuscus*, *bucki*, and *dahlgreni*) they are easily distinguishable from ordinary hairs by their diameters and position, but in forms where both spines and hairs are light colored (e. g., *D. ornicollis*, *darlingtoni*, and *masti*) the two are often difficult to distinguish from each other.

As already mentioned *Diphotus* has simple tarsal claws (pl. 3, fig. 29), although, as will be noted later, some species have an additional

"thumb" (pl. 3, figs. 30, 35). Aedeagal characters have already been considered, but this additional comment is relevant: Barber, in proposing the genus in 1941, designated as genotype *D. bucki* Barber, a form in which the aedeagus is greatly elongated and similar only to that of *D. masti* described below (pl. 3, fig. 26). However, a survey of aedeagal shapes in known diphotids suggests that there may be complete intergradation between the greatly attenuate lateral and median lobes in the two above mentioned species and the short compact structures of *Microdiphot cavernarum* Barber (pl. 3, fig. 28). Some idea of the size ranges encountered is given by plate 3, figures 26, 27, and 28.

DIPHOTUS DAHLGRENI, new species

PLATE 1, FIGURE 6; PLATE 2, FIGURE 17; PLATE 3, FIGURE 22

Field characters.—Length 7.5, width 3.2 mm.; oval; pronotal disc and elytra medium brown with broad white borders; abdominal sternites and tergites progressively darker to black hind end.

Male.—Pronotum 1.9 by 2.4 mm.; front margin semicircular, lateral margins subparallel in basal third, hind margin nearly straight; disc medium to dark brown with wide white border anteriorly and laterally, a narrower one along the hind margin. Scutellum and mesonotal plates dark brown. Elytron 5.6 by 1.6 mm.; widest at middle, lateral margin tapering smoothly in both directions; medium red-brown with white lateral border about one-third the elytral width, no sutural border. Head width 1.6 mm. Eye length 1.0 mm. Frons width 0.5 mm., black, deeply concave; interocular margins subparallel. Maxillary and labial palpi light brown to white. Antennae 3.2 mm., dark brown, segments 6 to 8 each a little more than twice as long as wide. Femora, tarsi, coxae, and ventral surface of thorax light brown, tibiae dark brown; claws medium brown; circlet of about a dozen slender spurs along the distal edge of the tibiae (pl. 2, fig. 17). Tergites grading progressively from light brown tergite 1 to jet black, semicircular pygidium. Sternites progressively darker from light brown (2) to black (7); 8 white, 9 lost, all with hind margins straight except 7 which resembles that of *P. immigrans* (pl. 2, fig. 20). Aedeagus (pl. 3, fig. 22, *a-c*) somewhat similar to those of *D. unicus* Mutschler and *D. semifuscus* Barber; lateral lobes white, closely apposed dorsally, internally hollowed, tapering posteriorly to slender apices tilted slightly dorsally; at apical fourth each lateral lobe has an anteriorly directed hook or tooth on its ventral surface in contact with the median lobe; median lobe white, cylindrical, lying deeply ventral in its basal two-thirds, constricting suddenly at about the level of the apical third of the lateral lobes to a laterally compressed thin sclerotized vane, which curves dorsally between and just short of the tips of the lateral lobes;

ventral surface of median lobe entirely membranous basal to the constriction.

Type.—U.S.N.M. No. 57321.

Distribution.—Belmore Castle, August 9, 1941, male type.

Named for Prof. Ulric Dahlgren, of Princeton University.

DIPHOTUS DARLINGTONI, new species

PLATE 1, FIGURE 7; PLATE 3, FIGURES 23, 27

Field characters.—Length 7.5, width 3.0 mm.; markedly constricted laterally between pronotum and elytra; elytra medium brown, disc dark brown, both with white borders and markedly long pubescence.

Male.—Pronotum length 1.8 mm., width 2.3 at half, 2.0 at base; bulbous; apical margin semicircular, basal margin moderately and evenly emarginate, hind angles about 90°; broadly bordered, except at base, in white; disc with dark brown irregular infuscation divided into lateral halves by a lighter, shallow, median sagittal groove; vestiture long and pale. Scutellum medium brown, lighter than elytra are at humeri; mesonotal plates light brown. Elytron 5.8 by 1.5 mm.; widest at basal third, then tapering gradually and evenly in lateral margin only; light brown or white (preservation poor), marked centrally with medium brown vitta, broad at humerus, thinning posteriorly and extending nearly to apex; lateral white border two-fifths elytral width, sutural border considerably narrower and basally obsolete; vestiture long and pale. Head width 1.7 mm. Eye length 0.9 mm. Frons width 0.5 mm.; black and purple mottled, markedly concave; interocular margins subparallel. Maxillary palpi medium brown. Antennae 3.2 mm., dark brown, segments 6 to 8 each about twice as long as wide and with hairs about as long as width of segment. Ventral surface of thorax medium brown; legs light brown; claws light brown; tibial spurs as in *D. dahlgreni* but difficult to see. Tergites progressively darker from light brown (1) to dark brown (pygidium); pygidium damaged, but apparently ogival, broadest just before base, with apical margin bordered in medium brown. Sternites increasingly darker from light brown (2) to dark brown (7), though lighter than corresponding tergites; 8 and 9 light brown; all with straight hind margins. Aedeagus (pl. 3, fig. 23, *a–c*) probably white although pale brown in this poorly preserved specimen; somewhat similar to that of *D. mutschleri* Barber; lateral lobes slender, parallel-sided, dorsoventrally flattened, horizontal, apposed to apical fourth where they separate laterally and accommodate apex of median lobe, then come together again at apices nearly to contact; median lobe completely ventral to lateral lobes except at apex, which is a sclerotized, laterally flattened vane, which projects between and slightly above the lateral lobes just short of their apices.

Type.—Museum of Comparative Zoology No. 26747.

Distribution.—Port Antonio, January 4 (no year given), F. C. Bowditch collector.

Named for Dr. P. J. Darlington, Jr., of the Museum of Comparative Zoology.

DIPHOTUS MASTI, new species

PLATE 1, FIGURE 9; PLATE 3, FIGURES 26, 30, 34–38

Field characters.—Length 8.0, width 3.0 mm. Pronotum with dark brown semicircular disc surrounded by white border. Elytra nearly parallel-sided, light brown with white borders. Abdomen dark brown, increasing to black at apex.

Male.—Pronotum 1.8 by 2.3 mm.; front margin semicircular, lateral margins in one specimen subparallel in basal third, in the other converging slightly at base; hind margin straight except at hind angles which project slightly backward; disc marked with dark brown semicircular spot bisected by vague narrow median sagittal light brown stripe, bordered apically and laterally by a wide, and basally by a narrow white border. Scutellum light brown. Mesonotal plates medium brown. Elytron 6.2 by 1.5 mm., nearly parallel-sided to apical fourth where it tapers sharply, mainly in lateral margin; light to medium brown, darkest at humerus, lateral border white, about one-third of elytral width and confluent at apex with narrower white sutural border. Head width 1.9 mm. Eye length 1.2 mm., projecting beyond pronotum. Frons width 0.5 mm., medium to dark brown, deeply concave; interocular margins parallel or slightly divergent dorsally. Maxillary and labial palpi white. Antennae 4.0 mm.; dark brown with basal segment light brown; segments 6 to 8 each four times as long as wide, and somewhat flattened. Legs and ventral surface of thorax light brown; claws medium brown, simple but with expanded basal plate or "thumb" inside the anterior claws of the front legs (pl. 3, figs. 30, 35) as in *D. bucki* Barber and to a less extent in *D. unicus* Mutschler and *D. ornicollis* Barber; circlet of inconspicuous spurs along distal rim of each tibia. Tergites increasingly dark from medium brown (1) to pygidium, which is brown bordered black, very large, ogival to blunt, with slight rounded projection from middle of hind margin; 7 and 8 broader than corresponding sternites. Sternites increasingly dark from medium brown (2) to black (7); 8 and 9 pale with medium brown apical borders; 9 greatly elongated and with dark recurved hooks and large muscles on internal surface (pl. 3, figs. 36–38) as in *D. bucki* Barber, suggesting its use as an accessory in mating. Aedeagus (pl. 3, fig. 26, *a-c*) identical in shape, structure, and size with that of *D. bucki* Barber; lateral lobes extremely long and slender, apposed dorsally except briefly at apical

fourth where they separate enough to allow the slender, pointed dorsally directed apex of the median lobe to fit between their tips in a socket formed by ventrally directed teeth, one on the internal ventral margin of the tip of each of the lateral lobes; median lobe flared ventrobasally to nearly the combined widths of the lateral lobes, tapering quickly apically to very slender tip, dorsally curved; median lobe sclerotized only laterally and dorsally, except for small rectangular piece imbedded separately in its ventrobasal membranous area.

Type and paratype.—U.S.N.M. No. 57322.

Distribution.—Cornpuss Gap, July 25, 1941, type male and one paratype male, latter from spider's web.

Named for Prof. S. O. Mast, of Johns Hopkins University.

Genus MICRODIPHOT Barber

This genus was erected by Barber originally to accommodate *M. cavernarum* Barber, a form apparently closely allied to *Diphotus* in aedeagal structure and position of photogenic organs, but differing in its minute size, its laterally compressed cylindrical shape, its sinuate elytra, and its pronotum bluntly arcuate in both anterior and posterior margins. *M. barberi*, described below, agrees with the genotype in all the mentioned particulars, thus strengthening the generic segregation of these forms. In addition, as described later, *M. barberi* has a flat frons, and a tibial spur pattern different from all other Jamaican lampyrid genera, agreeing in both these respects also with *M. cavernarum*.

MICRODIPHOT BARBERI, new species

PLATE 1, FIGURE 8; PLATE 2, FIGURES 18, 19; PLATE 3, FIGURE 24

Field characters.—Dimensions ranging from 4.6 by 1.0 to 5.3 by 1.1 mm. Body very slender and nearly cylindrical; elytra and most of abdomen black; pronotum widest at middle and arcuate both in front and hind margins, yellow to pink.

Male.—Pronotum 0.9 by 0.9 mm.; nearly flat; widest at middle, tapering equally to front and rear and resembling that of *Microdiphot cavernarum* Barber; apical and basal margins bluntly arcuate, hind angles obtuse; predominantly glistening yellow with irregular pinkish mottling, apical sixth dark brown; narrow deep groove with a prominent row of small indentations close to lateral and apical margins; narrow median sagittal groove to apical fifth. Scutellum flat, elongate, rectangular, light yellow, and sometimes with shallow median sagittal groove. Mesonotal plates white with dark brown borders. Elytron 3.7 to 4.3 mm. long; black or very dark brown, with narrow, white lateral and sutural borders; widest at humerus (0.5 mm.), tapering to 0.4 to 0.45 at basal fourth, then parallel-sided to apical fifth where final taper begins, mainly in lateral margin; elytra slightly sinuate so

that they are not in contact from about half to apices, which are apposed, dull, soft, and turned downward in pinned specimens; vestiture fine, dense, and black. Head width 0.73 mm. Eye length 0.32 mm., protruding slightly beyond anterior margin of pronotum. Frons width 0.29 mm., medium to dark brown, flat, interocular margins parallel to slightly divergent. Maxillary palpi light to medium brown, labials a little lighter. Antennae 2.5 mm.; dark brown, with markedly conical segments of which the terminal and sometimes subterminal ones are light brown; segments 6 to 8 each roughly twice as long as wide. Coxae, trochanters, femora, and ventral surface of thorax light brown, tibiae and tarsi medium brown; tibiae with a circlet of about a dozen short robust spurs on their distal ends and others on their outer surfaces (pl. 2, figs. 18, 19); claws medium brown. Tergites increasingly darker from light brown (1) to black (pygidium); pygidium broad, ogival, abruptly truncated, with apical margin slightly emarginate and about two-thirds the length of the basal margin; 7 and pygidium wider than the underlying sternites. Sternites increasingly darker from light brown (2) to dark brown (7); 8 white and truncated; 9 white with very slight posterior darkening; 7 slightly emarginate, 8 slightly notched at middle of hind margin. Aedeagus (pl. 3, fig. 24, *a-c*) wholly white; lateral lobes parallel-sided in apical two-thirds and tightly apposed dorsally except where diverging slightly near apex to accommodate the laterally compressed apex of the median lobe; lateral margins of lateral lobes converging abruptly at apical fifth to blunt tips directed posteroventrally; median lobe cylindrical to apical third where it is laterally compressed to blade, which projects dorsally between lateral lobes; each lateral lobe armed with a recurved hook at apical third on ventral internal margin.

Type and paratypes.—U.S.N.M. No. 57319.

Distribution.—Morces Gap (type locality), July 16, 1941, type male and five paratype males.

It is a pleasure to dedicate this attractive species to H. S. Barber, of the U. S. Bureau of Entomology and Plant Quarantine.

PRESBYOLAMPIS, new genus

This name is proposed for the species below described, the male of which differs from all other known Jamaican lampyrids in the distinctive structure of its aedeagus, in the fact that both tarsal claws on each foot are cleft (neither is cleft in *Photinus* and *Diphotus*, one is in *Photuris*), in the shape of the pronotum, and in a number of other characters. In the bifurcation of the claws and possibly in its aedeagal structure this new form resembles one I collected at Ceiba, Honduras, in August 1941. This latter form, Mr. Barber informs me, is probably *Photuris amoena* Gorham, 1880, described from Guatemala. Both

Mr. Barber and I, however, are agreed that neither of these forms belongs in *Photuris*, and Mr. Barber further thinks, on comparing them with samples of *Bicellonycha* Motschulsky, 1853, in the collection of the National Museum, that neither belongs there, although the cleft claws are a feature of the original description of *Bicellonycha*. Moreover, there is considerable doubt whether the genonym *Bicellonycha* is available anyway, because its originally designated genotype, *Lampyris albilatera* Gyllenhal, 1817, is believed by Mr. Barber to be properly assigned to the genus at present called *Photinus*.

Type of genus: *Presbyolampis immigrans*, new species, described below.

For the time being I am leaving open the question of whether the new Jamaican form and the Honduran one are congeneric, but there is sufficient resemblance to open up interesting speculations on the possible position of *Presbyolampis* as a descendant of ancient waif migrants from the Central American mainland across water gaps, as argued by Darlington (1938).

PRESBYOLAMPIS IMMIGRANS, new species

PLATE 1, FIGURE 10; PLATE 2, FIGURE 20; PLATE 3, FIGURE 25, 31

Field characters.—Length 8.0 to 8.5 mm., width 3.5. Both tarsal claws of each foot bifid; photogenic organs occupying only median half to third of abdominal sternites 6 and 7; sternite 8 with long slender point projecting posteriorly from middle of posterior margin; pronotum conspicuously short; elytra uniform dark brown to black.

Male.—Pronotum about 1.6 by 2.7 mm.; front margin blunt, but in two out of three specimens is produced at center to obtuse peak; side margins subparallel in basal half; hind margin sinuous, with hind angles produced posteriorly to conspicuous acuteness (60°); margins slightly uptilted at sides, markedly so in front; disc black, lateral borders white, apical border light brown; surface glistening and roughly pebbled; vestiture fine, dark, and very sparse. Scutellum dark brown centrally, light brown at margins. Mesonotal plates black. Elytron about 6.6 by 1.6 mm., uniform dark brown except for very narrow lateral white border and even narrower sutural one; parallel-sided to apical third where taper begins, mainly in lateral margin; surface as in pronotum. Head width 1.75 mm. Eye oval, 1.1 by 0.9 mm. and projecting from beneath pronotum. Frons width 0.6 mm.; very concave; medium to dark brown, then suddenly black dorsally; interocular margins very divergent (30°). Maxillary and labial palpi light brown to white and of similar subconical shape. Antennae 2.8 mm.; medium brown; segments 6 to 8 each two and one-half times as long as wide, with rather long vestiture. Tibiae,

tarsi, and ventral surface of thorax medium brown, coxae and femora white, tibiae thinner and more cylindrical than typical in *Photinus* and *Diphotus;* both claws of all feet bifid, with the inner of the two points shorter than the outer (pl. 3, fig. 31); tibial spurs light brown, distributed front 2, middle 2, hind 2. Tergites 1 to 6 medium brown, 7 and pygidium white laterally; pygidium ogival. Sternites 2 to 5 medium brown, 6 and 7 white except for medium brown anterior border of 6; 8 and 9 with some light brown areas; hind margins of 6 and 7 only very feebly emarginate, that of 8 prolonged medially to a slender point, closely applied to and overlapping the slender 9 (pl. 2, fig. 20); photogenic organs as in no other known male Jamaican firefly (except *P. lucernula* Barber), confined to central half or third of abdominal sternites 6 and 7 (pl. 2, fig. 20, *O*, cross-lined). Aedeagus (pl. 3, fig. 25, *a-c*) very different from that of any other known Jamaican firefly; wholly white; lateral lobes forming broad, dorsoventrally flattened, horizontal, thin, warped blades nearly meeting in median sagittal line and concealing the median lobe almost entirely, curving ventrally along lateral margins and tapering gradually to sharply pointed apices which are directed posteroventrally and provided with a few long chaetae; median lobe emerges from basal folded membranous collar as roughly cylindrical membranous mass, apparently with ventral functional opening, and bends dorsally near its apex to a point below the tips of the lateral lobes.

Type and paratypes.—U.S.N.M. No. 57315.

Distribution.—Morces Gap, July 16, 1941, type male and two paratype males.

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EXPLANATION OF PLATES

Plate 1

Dorsal Views

[In trimming the photographs the legs, which ordinarily project laterally beyond the elytra, were removed. In some specimens the abdomens were removed for study, and this accounts for the lightness of the area between the elytra. A few regions have been retouched slightly to restore contrast. The whitish specks on some of the elytra (e. g., fig. 10) are highlights.]

1, *Photinus lewisi;* 2, *Photinus pardalis;* 3, *Photinus nothoides;* 4, *Photinus harveyi;* 5, *Photinus elisabethae;* 6, *Diphotus dahlgreni;* 7, *Diphotus darlingtoni;* 8, *Microdiphot barberi;* 9, *Diphotus masti;* 10, *Presbyolampis immigrans.*

Plate 2

Detailed Structure

[Figures in *a*, *b*, *c* series represent dorsal, left lateral, and ventral views, respectively, of a single aedeagus, with the basal or anterior end upward. Magnification is not uniform but can be judged from the scale lines included, which are all 0.5 mm. In fig. 20 (and also figs. 32–34 of pl. 3) the relative widths of the sternites are not shown accurately because the camera lucida does not take account of their varying curvatures, which become foreshortened.]

11, Aedeagus of *Photinus lewisi*, new species (*LL*=lateral lobe, *ML*=median lobe, *B*=basal piece); 12, aedeagus of *Photinus pardalis*, new species (*IS*=internal sac); 13, aedeagus of *Photinus harveyi*, new species; 14, aedeagus of *Photinus nothoides*, new species; 15, aedeagus of *Photinus elisabethae*, new species; 16, inside or ventral surface of tibia of hind leg of *Presbyolampis immigrans*, new genus and species (*TI*=tibia, *TA*=most proximal tarsal segment, *S*=spur; same labels apply to figs. 17–19); 17, ventral surface of tibia of left middle leg of *Diphotus dahlgreni*, new species, showing spurs (same magnification as fig. 16); 18, ventral surface of tibia of left middle leg of *Microdiphot barberi*, new species, showing spurs (magnification same as fig. 13); 19, front view of leg shown in fig. 18 showing how spurs are distributed along outer surface of tibia; 20, ventral view of posterior part of abdomen of male of *Presbyolampis immigrans* showing photogenic organs (*O*, cross-lined) on sternites 6 and 7, posterior projection of sternite 8, and pygidium (*P*).

Plate 3

Detailed Structure

[See note under Plate 2]

21, Part of pronotum (*PR*) and elytra (*EL*) of *Photinus elisabethae*, new species, showing the mesonotal plates (*MP*) and their relation to the scutellum (*SC*); 22, aedeagus of *Diphotus dahlgreni*, new species; 23, aedeagus of *Diphotus darlingtoni*, new species; 24, aedeagus of *Microdiphot barberi*, new species; 25, aedeagus of *Presbyolampis immigrans*, new genus and species; 26, aedeagus of *Diphotus masti*, new species; 27, aedeagus of *Diphotus darlingtoni* reproduced to same scale as that of *D. masti* (fig. 26) to show the enormous absolute size difference possible in diphotids of about the same over-all size; 28, aedeagus of

Microdiphot cavernarum Barber, the smallest known Jamaican firefly (3.5 mm.), reproduced to same scale as figs. 26 and 27 to illustrate the extremes in known aedeagal absolute size and the fact that fireflies differing greatly in body size may differ less in aedeagal size; 29, claws of *Photinus elisabethae* illustrating the usual type in *Photinus* and *Diphotus* (this and the other claw drawings same magnification as fig. 13); 30, claws of left front leg of *Diphotus masti*, new species, showing enlarged plate or "thumb" (*T*), which points diagonally downward and is here foreshortened (see fig. 35); 31, claws of *Presbyolampis immigrans* showing bifid structure; 32, ventral view of part of abdomen of male of *Photinus elisabethae* showing position of photogenic organs (*O*, cross-lined); 33, ventral view of part of abdomen of female of *Photinus elisabethae* showing position of photogenic organ (*O*, cross-lined); 34, ventral view of part of abdomen of *Diphotus masti* showing position of photogenic organs (*O*, cross-lined); 35, side view of left front claw of *Diphotus masti* showing "thumb"; 36, dorsal surface of posterior end of sternite 9 of *Diphotus masti* showing recurved hooks (same magnification as fig. 37); 37, side view of sternite shown in figs. 36 and 38; 38, dorsal view of inner surface of sternite 9 of *Diphotus masti* showing recurved hooks at apex, its greatly elongated shape, and the muscles (*m*) attached at both ends.

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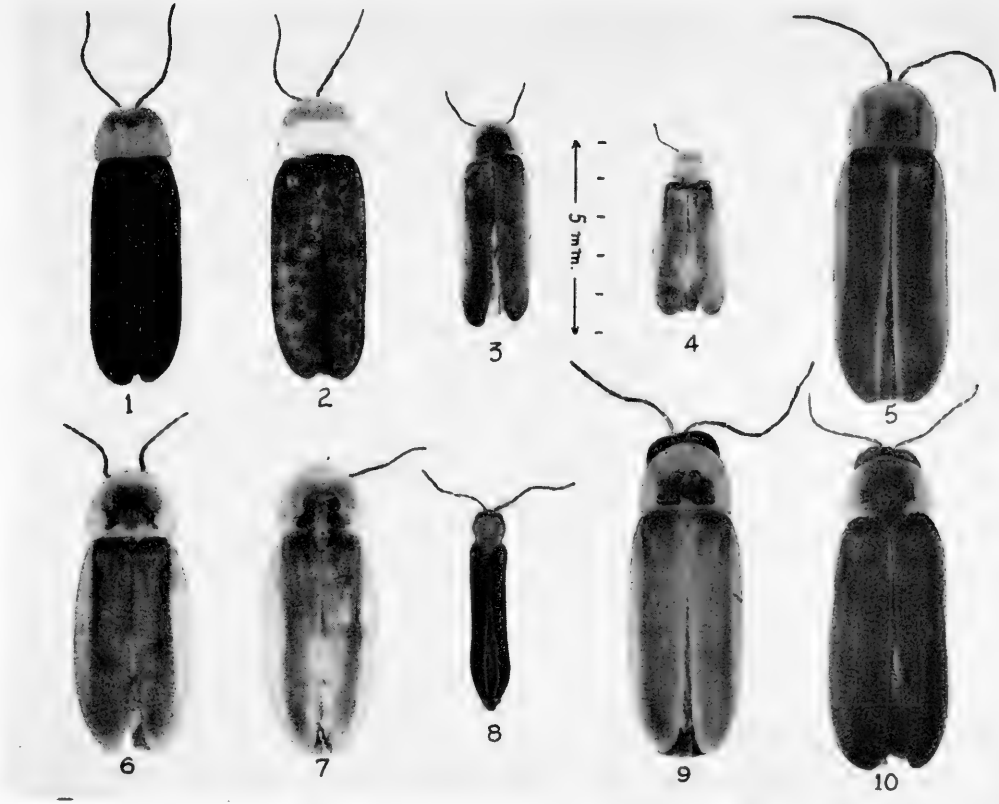
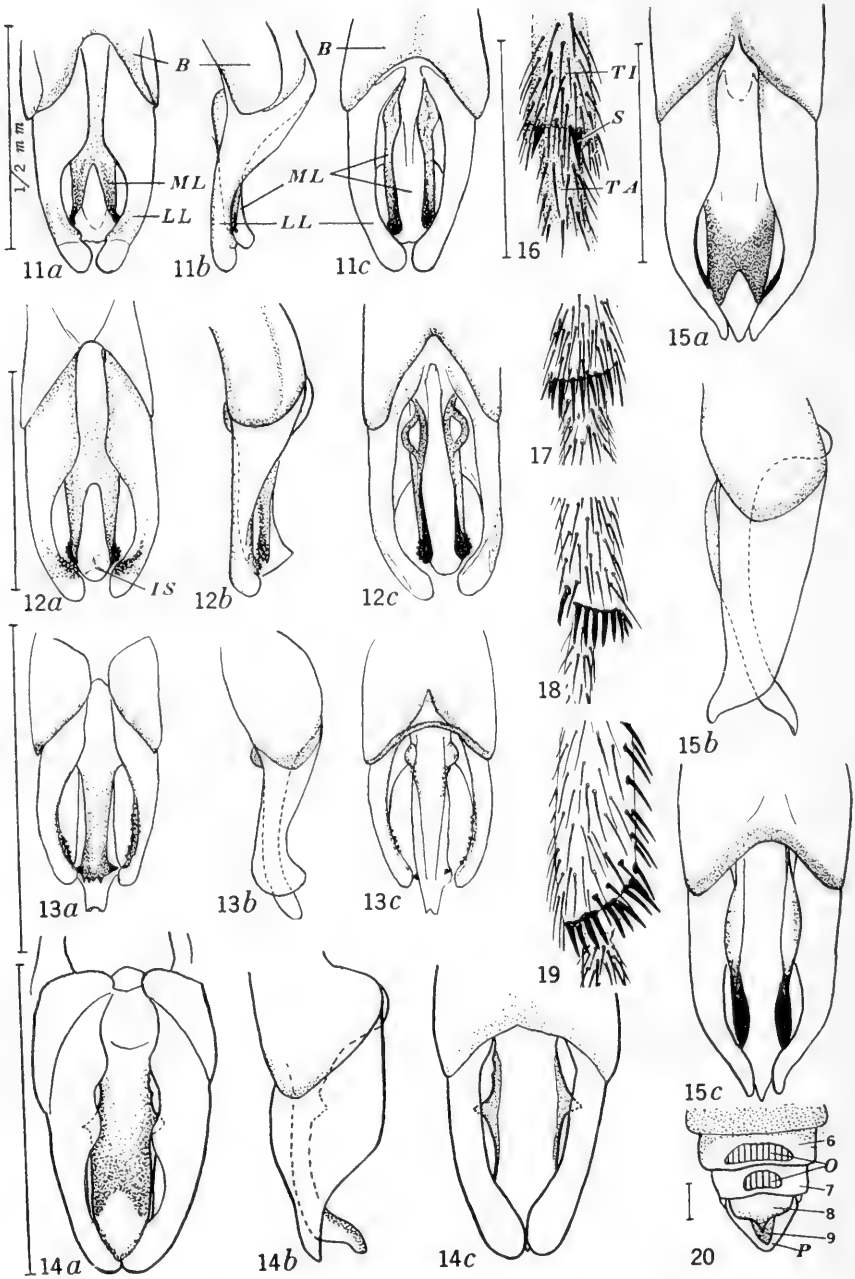


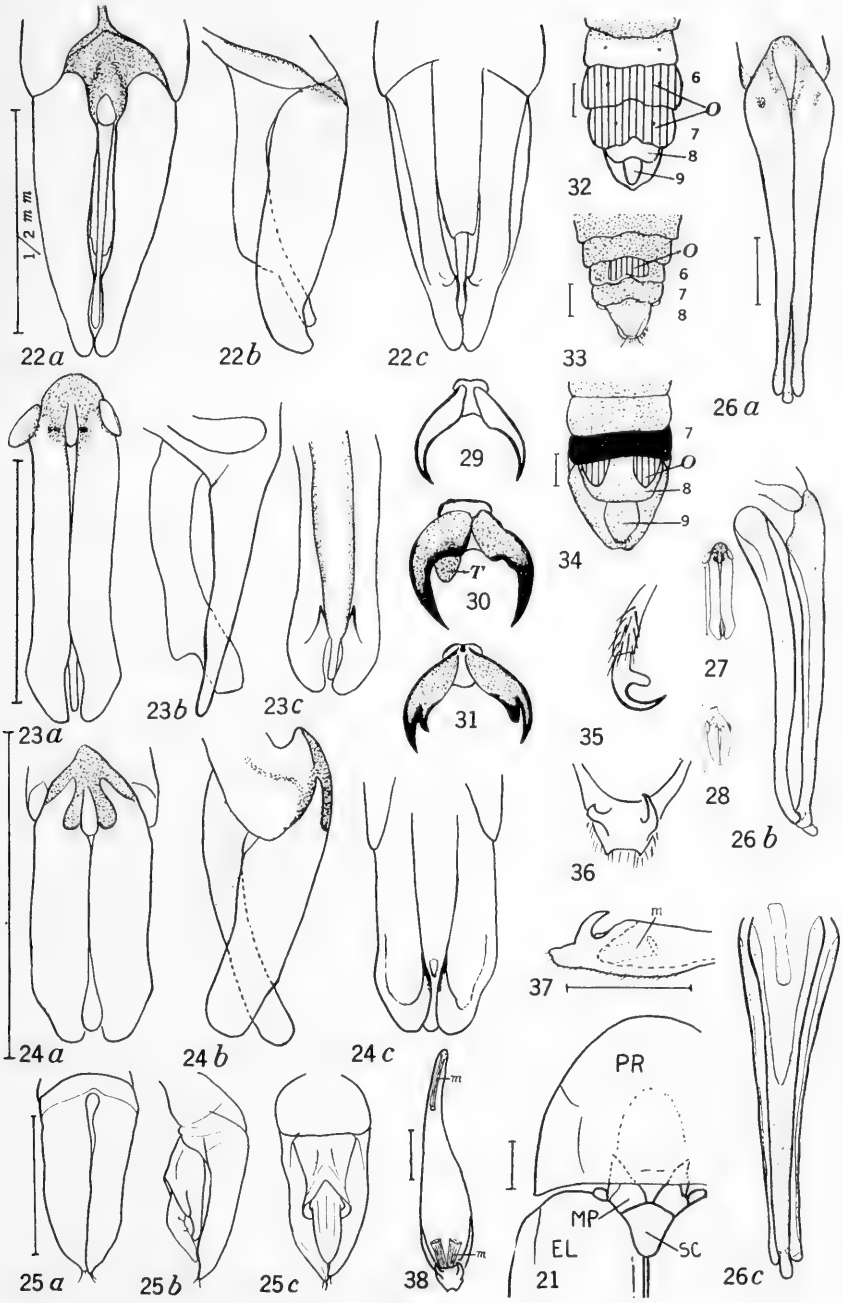
TEN NEW LAMPYRID FIREFLIES FROM JAMAICA.

FOR EXPLANATION OF PLATE SEE PAGE 78.



DETAILED STRUCTURE OF NEW JAMAICAN LAMPYRID FIREFLIES.

FOR EXPLANATION OF PLATE SEE PAGE 78.



DETAILED STRUCTURE OF NEW JAMAICAN LAMPYRID FIREFLIES.

FOR EXPLANATION OF PLATE SEE PAGES 78–79.

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A NEW GENUS AND SPECIES OF DEEP-SEA FISH OF THE FAMILY MYCTOPHIDAE FROM THE PHILIPPINE ISLANDS

By Robert R. Miller

The depths of the oceans have yielded forms of life that have long been of interest to biologists and that have fascinated scientists and laymen alike. A great variety of deep-sea fishes has been described, many of them grotesque in form and provided with highly specialized organs that adapt them for life in utter darkness. Our knowledge of a considerable number of these fishes is based only on single specimens, and quite often these were imperfect. Hence the precise systematic position of some genera, and even families, is not uncommonly in doubt (Chapman, 1939, p. 508; Parr, 1945, p. 127; Myers, 1946).

The novelty about to be described was collected by the *Albatross* during 1908–1909, on her Philippine cruise, and is based upon 31 specimens of graded sizes, a number of which are nearly perfectly preserved. This fortunate circumstance has permitted a far more complete description than is usually possible with deep-sea forms. Although taken nearly three-fourths of a mile beneath the surface, this fish shows few adaptations for abyssal life.

SOLIVOMER, new genus

Genotype.—*Solivomer arenidens*, new species.

Diagnosis.—Body elongate, moderately compressed, broadly oval in cross section, widest across head, deepest just behind occiput, from which it tapers gradually to caudal fin. Scales on body large (41

or 42 in lateral line), ctenoid, apparently covering the head also, where at least some (and perhaps most or all) of them are cycloid; those in lateral line conspicuously deeper than surrounding scales.

Dorsal fin higher than long, none of the rays produced, its origin a little nearer tip of snout than caudal base and almost directly over insertion of pelvics. Origin of adipose over that of anal fin, its free margin slightly fimbriate. Anal higher than long, its origin a little more than 1½ times nearer caudal base than insertion of pelvics. Pectorals lateral, inserted low (much nearer belly than lateral line), with narrow basis, the middle rays long and slender. Pelvics abdominal, 8-rayed. Caudal fin well developed, moderately forked, free from anal.

No photophores. Air bladder present. Pseudobranchiae rudimentary. Anus just before anal fin.

Maxillary extending beyond eye a distance about equal to diameter of eye, greatly dilated posteriorly, slipping under preorbital anteriorly; provided with a single slender supplementary maxillary, about one-third length of maxillary. Premaxillary long, slender, forming entire outer margin of upper jaw. Dentary broadest at symphysis, tapering gradually posteriorly.

Teeth finely granular, covering inner and outer surfaces of both jaws (except at the symphyses) so that they are clearly visible when the mouth is closed. Vomer angular, not indented at apex where it is widest, covered by finely granular teeth (fig. 2); same kind of teeth on the long, slender, tapering palatines and on the rounded entopterygoids. Tongue small, toothless, bound-down at the tip, with finely granular teeth on the long, narrow basihyal.

Branchiostegals usually 10 (9 on the right side in 2, 11 on the left side in 1, out of 29 specimens counted), slender, curved, becoming progressively more flattened from lowermost to uppermost. Gill membranes attached far forward, free from isthmus. Gill rakers on first arch rather long, slender, denticulate; those on succeeding arches shorter and spinulate at their tips.

Mesethmoid with a low, median ridge. Palatine with anterior end attached to vomer by a ligament, with a process directed upward and outward that overlaps the proximal end of the maxillary and is supported by a lateral projection of the mesethmoid. Parasphenoid extending upward to the frontals between the lateral ethmoids (Regan, 1911, pp. 121, 128).

The technical characters of *Solivomer* agree closely enough with those used to delimit the family Myctophidae (Regan, 1911; Parr, 1928; Bolin, 1939) that I refer it to that group of fishes. The lack of specializations, such as photophores, and the general normal appearance of the new genus suggest that it is a primitive form low in the evolutionary line along which the myctophids have advanced

FIGURE 2.—*Solivomer arnidens*, new genus and species: Holotype (U.S.N.M. No. 138929), 220 mm. in standard length. Inserts: Left, sketch of vomerine and anterior palatine dentition; right, a lateral-line scale (from paratypes). Drawn by Mrs. A. M. Awl.

(Gregory and Conrad, 1936, fig. 4, p. 31). Among known iniomids it appears to be most closely related to *Neoscopelus* Johnson (1863, p. 9, pl. 7) and *Scopelengys* Alcock (1890, p. 302), differing prominently from both by the continuous vomerine dentition—whence the generic name, *Solivomer*, meaning single vomer. Its relationships are discussed in greater detail under the specific description that follows.

SOLIVOMER ARENIDENS, new species

FIGURE 2

Holotype.—U. S. N. M. No. 138929, a specimen 220 mm. in standard length, collected by the *Albatross* in the Philippines, 9 miles off San Ricardo Point, Panaon Island, between Leyte and Mindanao Islands; lat. 10° N., long. 125°06′45″ E., July 31, 1909, at a depth of 772 fathoms.[1] Original tin-tag No. 9168, dredge haul 5488.

Paratypes.—Thirty specimens collected by the *Albatross* as follows: 3, U.S.N.M. No. 135927, 11.2 miles off San Ricardo Point, Panaon Island, between Leyte and Mindanao Islands, lat. 10°02′45″ N., long. 125°05′33″ E., July 31, 1909, 732 fathoms; 9, U.S.N.M. No. 135928, bearing the same data as the holotype; 1, U.S.N.M. No. 135929, 19.3 miles off Diuata Point, lat. 9°24′ N., long. 125°12′ E., August 1, 1909, 736 fathoms; 3, U.S.N.M. No. 135930, 15.2 miles off Diuata Point, lat. 9°12′45″ N., long. 125°20′ E., August 1, 1909, 735 fathoms; 4, U.S.N.M. No 135931, 4.2 miles off Diuata Point, lat. 9°06′30″ N., long. 125°18′40″ E., August 2, 1909, 678 fathoms; 1, U.S.N.M. No. 135932, 9.4 miles off Diuata Point, lat. 9°06′30″ N., long., 125°00′20″ E., August 2, 1909, 976 fathoms; 4, U.S.N.M. No. 135933, 18.4 miles off Balicasag Island, between Siquigor and Bohol Islands, lat. 9°12′45″ N., long. 123°45′30″ E., August 11, 1909, 805 fathoms; 1, U.S.N.M. No. 135934, 24.6 miles off Camp Overton Light, from the vicinity of northern Mindanao Island, lat. 8°34′48″ N., long. 124°01′24″ E., August 8, 1909, depth not recorded; 1, U.S.N.M. No. 135935, Sogud Bay, southern Leyte Island, 55 miles off Limasana Island, lat. 9°58′ N., long. 125°07′40″ E., April 10, 1908, 775 fathoms; 3, U.S.N.M. No. 135419, 19.5 miles off 30th of June Island, vicinity of eastern Palawan Island, lat. 9°13′00″ N., long. 118°51′15″ E., April 3, 1909, 1,105 fathoms.

Diagnosis.—A myctophid without photophores, with normal eyes, with large scales (41 or 42 in lateral line) which are ctenoid on body, cycloid on head; maxillary greatly expanded posteriorly; vomerine teeth in a single patch; all of the teeth granular.

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[1] Since the beam trawl used by the *Albatross* did not have a closing device, the precise depth of capture is not known.

Description.—The following description is based largely on a careful examination of the 31 types. The form and coloration are portrayed in figure 2, and measurements are given in table 1.

Fin rays: Dorsal fin with 1 to 3 rudimentary rays followed by 10 or 11 rays (the last regarded as split to the base), making a total of 12 to 14 rays, 9 or 10 of which are branched. Anal fin also with 1 to 3 rudimentary rays followed by 7 to 9 rays, making a total of 9 to 11 rays, of which 6 to 8 are branched. Pectoral rays 14 to 16, preponderantly 15, 11 to 13 of these rays branched; the usual formula is ii, 12, i, where the lower-case Roman numerals denote unbranched rays and the uppermost rays of the fin are written first. The lowermost unbranched ray is branched in about 16 percent of the specimens and rarely there are 2 unbranched rays in the lower part of the fin, as there are invariably in the upper part. The determination of branching in the pectoral rays requires close examination, for the slender rays often do not branch until the very tip is reached. Pelvic rays invariably 8–8, with a small splint attached to the base of the first (unbranched) ray in each fin. Principal caudal rays (branched rays plus 2 unbranched rays) 19, rarely 18.

Scales: The only accurate scale count I was able to make was of the lateral-line scales, which were 41 in 10 specimens and 42 in 15. The first scale counted was the first one lying across the lateral line, and the last one recorded was at the structural base of the caudal fin. The description of a scale from the left side of the body removed from just below the lateral line and perpendicular to the origin of the pelvic fin follows. This scale is roughly rectangular, about 1⅓ times deeper than long, and shield-shaped at the base (unexposed); it is denticulate over all or nearly all the exposed (posterior) margin, which is evenly rounded. The focus is very near the free margin. The circuli are numerous, regularly spaced, very fine and close-set. The lateral-line scale lying above and very slightly anterior to the scale just described is nearly twice as deep as long and 1½ times deeper, but no longer, than the scale below it. The middle part of the exposed margin has a broad notch (see fig. 2), and, because of the longer exposed edge, there are more ctenii than on the scale below; these ctenii are also noticeably stronger. The base of the lateral line scale is only very weakly shield-shaped. Otherwise this scale is like the one described above. A lateral-line scale from near the middle of the body is shown in figure 2. It is not so deep as those placed more anteriorly along the lateral line.

Branchiostegals: The branchiostegal formula, left side given first, varied as follows (number of specimens in parentheses): 11–10 (1), 10–10 (26), 10–9 (2). The counts for two specimens were too questionable to be recorded here.

Gill rakers: The gill rakers on the first gill arch of the right side

were counted on 20 specimens. There were 4 or, usually, 5 rakers on the upper limb, 13 or 14 on the lower limb, and 1 at the angle of the arch, making a total of 18 to 20, usually 19 or 20.

A detailed description of the detention of *Solivomer*, as well as of certain osteological and other characters, has already been given under the generic diagnosis.

The following proportional measurements with precision dividers were made on 10 specimens grading in size (standard length) from 98 to 270 mm. In standard length: Greatest depth of body 4.15 to 4.5; head length 2.8 to 3.05; caudal peduncle length 5.9 to 6.7. In head length: Head depth 1.45 to 1.6; head width 2.2 to 2.4; snout 4.1 to 4.4; eye 6.0 to 7.0; width of bony interorbital 4.5–5.1; maxillary length 1.55 to 1.75; mandible length 1.5 to 1.6; least depth of caudal peduncle 3.25 to 4.0; length of pectoral fin 1.3 to 1.55; length of pelvic fin 1.7 to 2.2; postorbital length 1.55 to 1.65; length of depressed dorsal fin 1.3 to 1.45; length of depressed anal fin 2.05 to 2.35. Greatest width of maxillary 1.1 to about 1.4, usually 1.1 or 1.2, in diameter of eye. Origin of dorsal fin nearer snout than caudal base by a distance varying between the diameter of the eye to the diameter of the orbit. Origin of anal fin much nearer caudal base than insertion of pelvics by a distance varying between the snout length to about one-half the length of the maxillary (as measured anteriorly to the tip of the premaxillary).

The general coloration of the new genus, after 37 or 38 years in preservation, is a rather uniform brown except for the opercular membrane which is brownish black in many specimens. Many of the scale centers are light yellow or yellow-brown and the scale margins are dark brown. The basal portions of all the fins, particularly along the interradial membranes of the dorsal and anal fins, are dark brown. This type of pigmentation extends outward a considerable distance on the caudal fin, fading distally. Similar dark-brown pigment occurs between the anterior and posterior bony rims of the preopercle and along the lower margins of the mandibles. Around the orbits of several specimens are delicate, irregular narrow lines of dark pigment usually nearly vertical with the body axis. The same type of lines are found on the top of the head, running obliquely away from the midline on each side.

Comparisons and relationships.—Solivomer differs from all other known genera of the Myctophidae, except *Scopelengys*, in lacking photophores. That monotypic genus, though known only from a few specimens, also lacks these organs. At first sight the resemblances between *Solivomer* and *Scopelengys* are very striking. The general body form, oblique mouth, wide of gape, general shape and position of fins, slender supramaxillary, extent of dentition, and rudimentary pseudobranchiae are remarkably alike in the two genera. The sharp

difference in the nature of the teeth, granular in *Solivomer* and villiform in *Scopelengys*, and in particular the very different vomerine dentition—in a continuous, angular patch in *Solivomer* (fig. 2) in contrast to two separate patches in *Scopelengys*—clearly indicate generic separation. Regan (1911, pp. 125, 128) used the general vomerine dentition (teeth in two well-separated patches) as a family character for both the Sudidae and Myctophidae, but Parr (1928, p. 16) found that *Notosudis* has more or less continuous vomerine teeth, and Bolin (1939, p. 113) noted a similar condition in the myctophid *Hygophum*. Chapman (1939, pp. 520, 523) has described similar dentition in *Sudis squamosa* and *Lestidium* (or *Bathysudis*) *parri*.

In addition to these sharp differences *Solivomer* differs further from *Scopelengys* in having (1) ctenoid rather than cycloid body scales; (2) 10 rather than 8 branchiostegals; (3) the anal fin farther back, so that the origin of the adipose fin lies over the origin, rather than over the last rays, of the anal fin; (4) principal dorsal rays 10 or 11 rather than 11 or 12; (5) principal anal rays 7 to 9 rather than 11 to 13; (6) eyes normal rather than reduced; (7) mouth less oblique; and (8) preorbital narrower.

Just as this paper was finished, a specimen of *Scopelengys tristis* was discovered by chance while moving some jars of unidentified fishes in the National Museum. The retention of three scales on this fish gives us, as far as I am aware, the first information on the squamation of *Scopelengys*. The best-preserved scale is embedded and lies along the midline of the right side of the body, just anterior to the origin of the anal fin. It is cycloid, oval, deeper than long, and lacks radii. The greatest length is about 6.2 mm., the greatest width approximately 4.2 mm., and the focus is far away from the scale center—apparently near the exposed end of the scale, as in *Solivomer*. The circuli are widely spaced near the center, showing typically rapid initial growth, but are regularly spaced from there to the scale margin, thus indicating uniform water temperature which is to be expected at great depths. Two other scales, loosely attached, are similar in structure and general form to the one just described but differ in shape as do scales from different parts of the body. One, the largest, lies near the dorsal base on the right side of the body; the other, much smaller, lies near the anal base on the left side of the body. From the size of these scales and the retention of most of the scale pockets, it is possible to estimate that this specimen of *Scopelengys* had about 32 scales along the lateral line. Thus the scales are larger than in *Solivomer*, which has more than 40 along the lateral line. The standard length of this specimen is about 135 mm. It bears U.S.N.M. No. 132459 and represents an extension in the known range of the genus. The precise location of

capture is in doubt, however, for there were two loose labels in the jar containing this fish. It was collected by the *Albatross* on November 19 or 22, 1904, at either station 4669 or 4675. Both of these stations lie off Callao, Peru,[2] station 4669 at latitude 12°13′ S., longitude 80°25′ W., and station 4675 at latitude 12°54′ S., longitude 78°33′ W. The known range of the genus *Scopelengys* may now be stated as the Arabian Sea and the Pacific coast of Mexico, Central America, and South America. Norman (1939, p. 28) recently recorded new material from the Arabian Sea.

Parr (1928, pp. 47–48) divided the Myctophidae into three subfamilies, Scopelenginae, Neoscopelinae, and Myctophinae, principally on the basis of the presence or absence of photophores and their arrangement when present. Following this system, *Solivomer* would fall into the Scopelenginae, but as the new genus obviously forms an independent line it is possible that it should be placed in a separate subfamily. The continuous vomerine dentition, as well as the granular nature of the teeth, could be used to justify subfamily ranking. For similar reasons, Parr (1928, p. 16) regarded *Notosudis* of the Sudidae as comprising a distinct subfamily. Without further study, however, particularly of the osteology of the genera of myctophid fishes, I hesitate to add another subfamily to the list.

Solivomer combines a number of primitive or generalized features with some specialized ones, which suggests that it is close to, but not in direct line with, the basic type from which the Myctophidae may have evolved. Gregory and Conrad (1936, fig. 4, p. 31) chose *Neoscopelus* to represent the primitive myctophid and I agree that this genus is a generalized representative. It differs most conspicuously from both *Solivomer* and *Scopelengys* in possessing photophores in the belly region (and also under the free tip of the tongue), and in the following features it appears to be somewhat more specialized than *Solivomer:* (1) vomerine teeth in two broadly connected patches—a character that appears to have been generally overlooked, for these teeth, when present in the Myctophidae, are generally described as being in two well-separated patches; and (2) 9 rather than 10 branchiostegals. Probably all three of these genera, *Solivomer*, *Scopelengys*, and *Neoscopelus*, represent offshoots from the base stem of the Myctophidae, with *Solivomer* and *Neoscopelus* nearer the generalized stock than *Scopelengys.*

One-eyed specimen.—Of the 31 specimens of *Solivomer arenidens* available to me, all except one are normal-eyed. One adult paratype,

[2] The possibility that the specimen was taken in the Alexander Archipelago of Alaska seems remote but should be mentioned. A third label in the jar, loosely but definitely wrapped in paper with some other fishes, reads "Dr. 4749 Aug. 29, 05 Albatross." This locality is at lat. 55°33′ N., long. 131°51′48″ W.

U.S.N.M. No. 135935, 225 mm. in standard length, has a fully developed right eye but the left eye is atrophied. The left orbit is developed but is completely closed over by skin and scales to form a concave pocket through which no part of the eye is visible. Otherwise, this fish appears to be perfectly normal.

Range.—The new genus is so far known only from the material listed herein (see sections on "Holotype" and "Paratypes"), all of which came from various islands in the Philippines.

Etymology.—The specific name *arenidens*, meaning "sand tooth," refers to the sandpaperlike dentition. *Solivomer* refers to the single patch of vomerine teeth.

Acknowledgments.—In working out certain osteological characters of *Solivomer* I received the generous assistance of Dr. Leonard P. Schultz. Dr. Carl L. Hubbs kindly suggested the generic and specific names.

TABLE 1.—*Measurements of* Solivomer arenidens *expressed in thousandths of the standard length*

Character	Holotype	Paratypes									
Standard length, mm	220	282	251	243	230	210	178	165	144	103	97
Dorsal origin to tip of snout	479	476	480	478	476	480	483	490	484	473	484
Tip of snout to pectoral base	349	294	332	348	334	345	352	345	341	343	335
Tip of snout to pelvic origin	491	467	462	494	466	483	482	482	464	461	451
Tip of snout to adipose origin	789	789	783	790	791	798	784	776	805	776	799
Tip of snout to anal origin	820	787	811	807	804	790	803	812	790	769	770
Anal origin to caudal base	219	227	229	223	233	229	232	224	225	243	237
Body, greatest depth	238	247	229	241	229	229	226	213	225	219	216
Depth at dorsal origin	228	246	211	221	217	218	199	207	213	186	184
Greatest width	117	118	123	117	113?	114	121?	115	121?	95?	95?
Dorsal to pelvic origins	219	225	205	209	209	211	194	202	213	184	176
Dorsal to anal origins	373	378±	355±	355	356	347	350	345	365	357	349
Head, length	348	343	343	352	341	343	338	342±	339	338	334
Depth	209	204	211	212	200	196	211	201	213	215	207
Width	133	134	143	137	132	127	149	129	149	136	134
Caudal peduncle, length	155	167	168	160	163	168	166	162	155	171	164
Least depth	106	105	102	107	103?	100?	93?	101	97	82?	77
Interorbital, least bony width	65	72	76	70	66	71	66	64	70	70	69
Snout, length	79	76	77	79	81	79	79	81	82	82	79
Orbit, length	64	61	62	60	61	64	64	66	64	66	65
Eye, length	50	46	54	50	51?	54	?	56	57?	57	57
Maxillary, length	206	200	199	209	199	204	210	206	209	209	213
Mandible, length	211	200	207	213	205	210	218	211	218	214	215
Dorsal, depressed length	247	245	250	232	233?	233	238	232	238	------	232
Basal length	128	133	129	132	133	133	132?	130	125	126	128
Anal, depressed length	155	157	157	150	149?	152	162	------	172	140	155
Basal length	68	64	63	67	71	66	66	66	75	66	72
Adipose, depressed length	86	87	78	81	78	85	91	85	86	78	75
Basal length	24	35	27	23	25	24	35	24	21	31	28±
Pectoral, length	213±	236	233	207?	205?	207?	245	229	181?	------	171±
Pelvic, length	191	189	197	174	177?	172	190	188	184	145±	136?

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A REVIEW OF THE LARVAEVORID FLIES OF THE TRIBE LESKIINI WITH THE SETULOSE FIRST VEIN (R_1)

By Maurice T. James

In spite of the fact that certain of them are actually or potentially important parasites of agricultural pests, the tachina flies of the tribe Leskiini have been neglected by taxonomists. No comprehensive treatment of the species has ever been published. The writer had undertaken a study of the genera and species of the New World, but, seeing that its completion would require more time than he had at his disposal, he decided to limit it to the group here under discussion, namely, to those genera in which the first vein (R_1) is setulose to or practically to the apex. So far as known, no Old World genus possesses this character.

Townsend,[1] after keying out on another basis a genus which does not concern us, uses the setulose first vein as the first major division of his tribe Leskiini. In this section he places seven genera, of which six, including two that I am reducing to synonymy, form a closely related complex. The seventh genus, *Spathipalpus* Rondani, is probably not a leskiine; at any rate, its relationship to the other six is quite distant. Since Townsend has placed it in this tribe, I am including it in the generic key, though omitting it from the body of the work.

The terminology used in this paper is basically that used by Townsend; some modifications are made for the purpose of increased clarity. All measurements were made by a micrometer scale; in some cases these differ radically from those stated in the original descrip-

[1] Manual of myiology, pt. 4, p. 65, 1936.

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tions, thus demonstrating the fallacy of making measurements by eye. In measuring the haustellum I have taken only its corneous portion; the membranous parts sometimes extend its length slightly, but to measure them would mean the unnecessary addition of a variable element.

This study has been made chiefly on the basis of material in the United States National Museum. I am however, indebted also to the following individuals and institutions for the loan of small, though valuable, collections: Dr. H. J. Reinhard, Texas Agricultural Experiment Station; A. R. Brooks, Division of Entomology, Ottawa, Ontario; and Dr. C. H. Curran, American Museum of Natural History.

As limited above, this complex of genera will trace with relative ease through Townsend's [2] complicated keys to the families and tribes of Oestroidea. In the family key the genera [3] will run to couplet 47, page 12; in the key to the tribes of Dexiidae, they run to couplet 4, page 27. The characters which, according to Townsend's Manual, may be considered diagnostic of the group under consideration, may, therefore, be summarized as follows:

Head not swollen. Cheeks distinct, at least one-eighth eye length. Antennal arista thin, with short to medium pubescence. Epistoma of moderate width, slightly to moderately warped forward, distinctly shorter than clypeus. Proboscis once geniculated; corneous part of haustellum at least half head height, slender, often bowed or curved, set with scattered to rather dense, erect, short setulae. Frontal bristles moderately strong, at least one on each side placed below base of antenna; hind reclinate, frontoorbitals not closely approximated to the verticals; ocellars present though sometimes weak, proclinate, divaricate. Prosternum [4] and propleura bare; tympanic ridge bare; thorax without plumose hairs. Pteropleural bristle shorter than the sternopleurals. Abdomen 4-segmented, ovate, not "wasplike"; tergites covering ventral membrane and larger parts of sternites.

In addition to the above, this group of genera may be characterized as follows: Form moderately slender. Head from lateral view trapezoidal, its length at oral margin at least 0.8, sometimes equal to, that at base of antennae; front gently sloping, flat to moderately convex, its length equal to or slightly less than that of face; clypeus not or but slightly depressed, 1.25 to 1.50 as high as its maximum width, without a facial carina; parafacials bare, two to three times as wide at base of antennae as at narrowest point; vibrissae strong, each surrounded

[2] Manual of myiology, pt. 3, 1936.

[3] *Proleskiomima*, in which the prosternum is provided with hairs and bristles, is an exception; it will trace to couplet 33, page 10.

[4] See footnote 3.

by a few setulae, rarely by several short bristles; facials otherwise bare. Eyes bare or practically so. First segment of antenna short, erect; second moderately long; third 2 to 3.5 times as long as second; arista with both basal segments short, the third slender, somewhat thickened basally, with moderately dense short hair to tip. Postocellar bristles small, one-fourth to one-third length of inner verticals, the latter strong; usually two, sometimes three or four, gnathoorbitals.

Transverse suture distinct, crossing mesonotum at or somewhat before middle. Presutural acrosticals present or absent; one postsutural (prescutellar) acrostical; two or three presutural dorsocentrals; three postsutural dorsocentrals; no posthumeral; usually one preintraalar, the hind one, when present, being weak; three (rarely two) postintraalars; one, sometimes two, presupraalars; three postsupraalars, the middle one especially strong; intrapostalar absent or extremely weak; two postalars, the hind one especially strong; normally three sternopleurals. Wing 0.40 to 0.45 as wide as long; cell R_5 narrowly open or rarely short-petiolate, ending not more than length of cross vein r-m from wing tip; vein R_1 with setulae extending to its apex, or at most with one or two apical setulae missing; vein R_5 setulose approximately to cross vein r-m, the setulae ending sometimes slightly before, sometimes slightly beyond that point; stem vein (base of radius, or the remigium or Townsend's terminology) bare; vein R_5 bowed down apically; cubitulus gently rounded and without a stump; apical section of Cu_1 short; cross vein r-m half to three-fifths the distance from r-m to the cubitulus.

Abdomen short; ovate; first segment with a pair of lateral bristles, with or without a pair of median marginals; second segment with one or more pairs of laterals; third and fourth each with a marginal row; no discals on any segment. Male genitalia small, anal forceps broad basally, with a narrowly tapered slender point; both anterior and posterior claspers present; aedeagus short and rather slender.

In coloration the species conform to a fairly uniform pattern. The body is either actually predominantly yellow or apparently so as a result of the dense pollinosity which obscures the areas of black background on the head and thorax. Each half of the mesonotum has two longitudinal vittae formed from brownish to black pollen; the inner one, located between the dorsocentral and acrostical rows, is narrow, from one to three times as wide as the diameter of a trichopore of a dorsocentral bristle; it is not interrupted at the suture and may reach the anterior margin of the mesonotum; the outer and much broader one, located between the dorsocentral and intraalar rows, is distinctly separated by pale-pollinose areas from both the anterior and the posterior margin of the mesonotum, and is broadly interrupted at the suture. The abdomen is yellow in background, with black markings.

KEY TO THE GENERA

1. Palpus approximately as long as third antennal segment and extending beyond oral margin, if at all, by a distance not greater than length of second antennal segment; vertex at least one-third head width ---------- 2
   Palpus usually 1.3 to 2 times length of third antennal segment and extending beyond oral margin by a distance usually twice or more the length of second antennal segment; if palpus is but little longer than third antennal segment, vertex less than one-fifth head width ---------- 4
2. Prosternum bare; frontalia approximately as wide as a parafrontal; lateral postscutellar plates bare; tergites mainly shining dorsally ---------- 3
   Prosternum bristled at sides; frontalia approximately width of combined parafrontals; each lateral postscutellar plate with a tuft of setulae; tergites pollinose dorsally ---------- 1. Proleskiomima
3. Haustellum cylindrical, not noticeably constricted on apical half, at most three-fourths head height; outer verticals prominent; male without proclinate frontoorbitals and with elongated tarsal claws ---------- 2. Leskiella
   Haustellum strongly constricted on approximately penultimate fourth, at least almost head height; outer verticals absent or indistinguishable from postocular setulae; males and females alike with two proclinate frontoorbitals and with short tarsal claws ---------- 3. Leskiomima
4. Costal spine strong; front noticeably flattened; three proclinate frontoorbitals; three frontals below antennal bases ---------- Spathipalpus
   Costal spine rudimentary; front at least slightly convex; at most 2 proclinate frontoorbitals, except as an abnormal condition; one or two frontals below antennal bases ---------- 5
5. Vertex about one-third head width, that of male slightly narrower than that of female; male and female alike with two proclinate frontoorbitals and with short claws ---------- 4. Dejeaniopalpus
   Vertex not more than two-sevenths, usually one-fourth to one-sixth head width, and much narrower in male than in female; male without frontoorbitals and with elongated claws ---------- 5. Genea

1. Genus PROLESKIOMIMA Townsend

Proleskiomima TOWNSEND, Rev. Ent., vol. 4, pp. 395–396, 1934; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, pp. 234–235, 1939.

Female (male unknown).—Head 0.6 as long and 1.25 as wide as high. Front flat in profile; vertex 0.4 head width; frontalia broad, about twice maximum width of a parafrontal; epistoma in clypeal plane; parafacial at base of antenna fully three times as wide as at narrowest part; facials approximately in clypeal plane, each with a few very short setulae and two or three short bristles near vibrissa; cheek 0.2 eye height. Haustellum in type specimen partly withdrawn, but apparently about half head height; straight, cylindrical, becoming somewhat smaller in diameter toward apex; labella small; palpus spatulate, slightly bowed, approximately as long as third antennal segment, with two or three outstanding setulae near apex below. Third antennal segment three times as long as second. Lateral postscutellar plates each with a tuft of short black hairs between halter and base of

squama. Hind tarsus two-thirds as long as its tibia. Cell R_5 narrowly open; vein R_1 with setulae approximately evenly spaced and extending to its apex.

Chaetotaxy.—Postocellars slightly divergent; outer verticals strong, 0.8 as long as inner verticals; ocellars weak; two proclinate and two reclinate frontoorbitals, almost in a line with the frontals; two strong frontals, anterior one below base of antennae. Three feebly developed, yet distinct, presutural acrosticals; three presutural dorsocentrals; two humerals; two lateroscutellars; no apicoscutellars; one discoscutellar placed far back and approaching position of an apicoscutellar; two small bristles and several fine hairs in a pteropleural tuft; two hypopleurals; two small bristles and several hairs laterally on the prosternum. Second abdominal segment with strong median marginals.

PROLESKIOMIMA FRONTALIS Townsend

Proleskiomima frontalis Townsend, Rev. Ent., vol. 4, p. 396, 1934.

Length, 5.5 mm. Head with ground color of parafrontals and of occiput above level of lower eye margins black, of frontalia orange, otherwise yellow; densely covered with pollen which is for the most part whitish, that of frontalia, however, golden, and that of vertex and upperpart of occiput brownish yellow; parafrontals with scattered black hairs ending opposite anterior frontals; a few minute black setulae around each vibrissa. Antenna yellow, third segment brownish; second segment at apex above and third on upper surface with black setulae. Palpus with a few black hairs below, otherwise with short black setulae. Proboscis brownish, labella yellow, erect hairs of haustellum black, those of labella brownish. Postocular hairs black above, whitish on lower third; occipital vestiture, except a few hairs on each side above, whitish.

Ground color of mesonotum and scutellum blackish, of pleura yellowish, becoming brownish on pteropleura and metapleura; pollen whitish on pleura, becoming light golden on mesopleura and pteropleura, and brownish yellow on mesonotum; mesonotal vittae broad, the inner in width two to three times diameter of a trichopore of a dorsocentral bristle. Coxae and trochanters yellow; hind femur and tibia yellow, becoming brownish apically; hind tarsus blackish, the segments becoming yellow toward their apices. Hairs of mesonotum, scutellum, coxae, and hing legs black, moderately dense; those of pleura of same color, but sparse. Wing lightly infuscated; squamae whitish; halteres yellow.

Abdomen mainly reddish yellow; segment 1 narrowly brownish toward median line dorsally; segments 2 to 4 largely blackish in ground color on dorsal surface of tergites, second and third each with a broad

reddish-yellow basal triangle on each side, fourth broadly reddish yellow laterally; abdomen with dense yellowish pollen forming a somewhat tessellated pattern but not, however, obscuring the background.

Holotype.—Female, Itaquaquecetuba, São Paulo, Brazil, June 1, U.S.N.M. No. 57287.

The description is based on the type, the only specimen known to me. It is in good condition except that one antenna and the artista of the other one are missing, and the legs, except one hind one, are broken off beyond the trochanters. Townsend described the arista as "long as antenna and micro pubescent" and the legs as "fulvous, tarsi dark."

2. LESKIELLA, new genus

Front moderately convex; width of frontalia at middle subequal to or a little less than that of a parafrontal; vertex one-third head width in female, two-sevenths in male; epistoma slightly warped; parafacial twice as wide at base of antennae as at narrowest point; cheek one-fourth to one-third eye height. Haustellum 0.60 to 0.75 head height, straight, cylindrical, and approximately of equal diameter throughout, none of its setulae arising from pigmented pores; labella small; palpus bowed, subequal to third antennal segment in length in the female but shorter in the male, with one or two outstanding setulae ventrally at about three-fourths its length. Third antennal segment 3 to 3.5 as long as second; aristal hairs approximately equal in length to basal diameter of arista. Lateral postscutellar plates bare. Tarsi somewhat longer than tibiae; claws in female short, in male longer than fourth or fifth tarsal segment. Wing with cell R_5 narrowly open; vein R_1 with setulae approximately evenly spaced and extending not quite to tip, usually one or two of the apical setulae missing.

Chaetotaxy.—Postocellars not decussate; outer verticals clearly differentiated, more prominent in the female, one-half to one-third length of inner verticals; ocellars moderately strong, two proclinate and one small reclinate frontoorbitals in the female, no proclinate and one small reclinate frontoorbital in the male; six to eight frontals, the anterior two small, the first distinctly below, the second slightly below and almost level with, the antennal bases, the first sometimes duplicated. Presutural acrosticals absent or one or two pairs moderately developed and distant from suture; 2 presutural dorsocentrals; hind preintraalar wanting; two, rarely, three, humerals; two postalars; usually three lateroscutellars, the intermediate pair set close to the hind one, usually weak but distinctly stronger than surrounding hairs, the hind pair convergent but not decussate; one discoscutellar; no apicoscutellars; one moderately small pteropleural; four or five hypopleurals. No median marginals on first and second abdominal segments.

Genotype.—Leskiella brevirostris, new species.

LESKIELLA BREVIROSTRIS, new species

FIGURE 3, *b*

Length, 4 to 6 mm. Occiput on upper third or half black; head otherwise yellow in ground color. Pollen of frontalia yellow, scattered, showing best from front view; that of parafrontals yellow; that of rest of head whitish with a yellowish tinge. Parafrontals bare or with a few scattered fine black hairs; a few black setulae of varying size around each vibrissa. Antenna yellow, the third segment with an

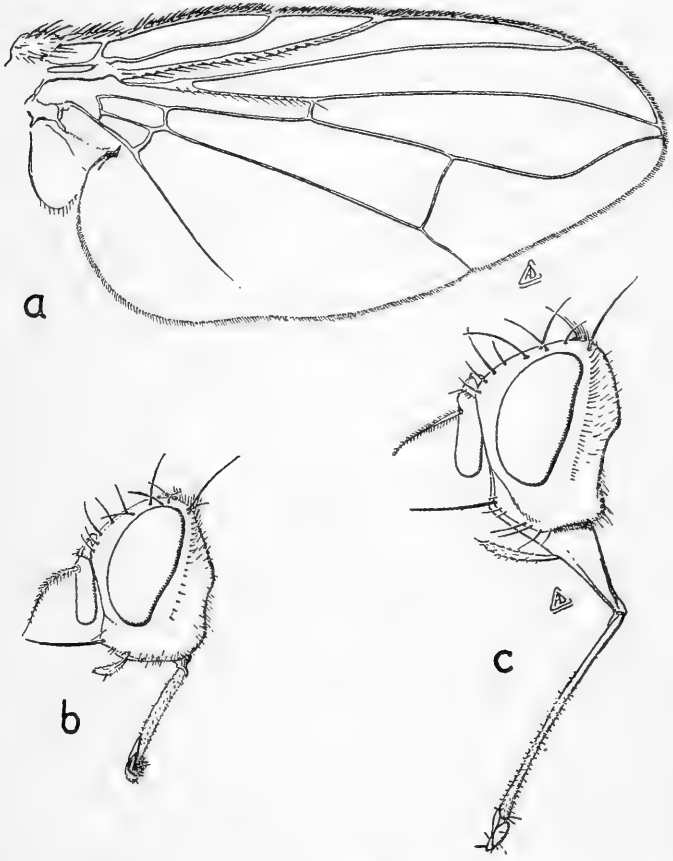

FIGURE 3.—*a*, *Leskiomima tenera* (Wiedemann), wing; *b*, *Leskiella brevirostris*, new species, head, lateral view; *c*, *Leskiomima tenera* (Wiedemann), head, lateral view.

orange cast basally, largely infuscated on apical half or more, the infuscation extending almost to the arista dorsally, darker and more extensive from an inner than from an outer aspect; first segment dorsally and second segment dorsally and apically with a few black hairs; arista yellow, becoming somewhat infuscated on apical half or

less; hairs concolorous. Proboscis yellow; haustellum on apical third and labella reddish yellow; erect hairs of haustellum and labella black with some yellow intermixed. Palpus, aside from the preapical setulae, with some fine black hairs ventrally and with scattered short, sharp setulae. Occipital vestiture black on upper fourth, otherwise soft, yellow.

Thorax dull black in ground color, except humeri, sides of mesonotum, scutellum, propleura, upperparts of mesopleura, and other pleural areas of varying extent along the sutures, which are yellow; pollen whitish on pleura and sternum, yellowish dorsally, on humeri, and just above notopleural suture; inner mesonotal vitta about as wide as diameter of a trichopore of a dorsocentral bristle. Pile of mesonotum, scutellum, and upper part of humerus black; that of extreme sides of mesonotum, lower part of humerus, and pleura yellowish. Legs yellow, the tarsi infuscated and becoming distinctly black at approximately middle of basitarsus; coxae whitish pollinose, legs otherwise without pollen; pile black. Abdomen yellow, usually becoming orange-tinted on third and fourth segments; third and fourth tergites each with a small black spot on each side posteriorly; sometimes similar spots may occur in a like position on the second and in a median position on any segment; pollen sparse and barely disernible, none of it showing dorsally; pile black, except on ventral surface of first tergite, where it is fine and yellowish.

Types.—Holotype, male, Atlanta, Ga., July 9, 1941 (P. W. Fattig), U.S.N.M. No. 57288. Allotype, female, Harriman, Tenn., July 27, 1933 (H. G. Butler). Paratypes: 1 male, Atlanta, Ga., July 10, 1941 (Fattig); 3 females, Harriman, Tenn., July 30, July 31, and August 2, 1933 (Butler); 1 female, No. 1800, North Carolina; 1 male, Staunton, Va., May 25, 1916 (J. Silver); 1 male, Clemson College, S. C., August 7, 1931 (J. E. Webb); 1 male, College Park, Md., July 26, 1918, "from *L. molesta*"; 1 male, Vienna, Va., October 29, 1913 (R. A. Cushman), reared from codling moth, Quaintance No. 7983 [all U. S. N. M.]; 1 female, Carbondale, Ill., August 13, 1927 (Chandler), "?parasite of codling moth" [Canad. Nat. Coll.]; 1 female, Belleair, Fla. (Mrs. A. T. Slosson), Acc. 26226 [Amer. Mus. Nat. Hist.].

The known hosts are *Grapholitha molesta* (Busck) and *Carpocapsa pomonella* (Linnaeus).

3. Genus LESKIOMIMA Brauer and Bergenstamm

Leskiomima Brauer and Bergenstamm, Denkschr. Akad. Wiss. Wien, vol. 58, p. 372, 1891; vol. 60, p. 133, 1893.—Coquillett, U. S. Dept., Agr., Div. Ent., Tech. Bull. 7, p. 67, 1897.—Townsend, Rev. Mus. Paulista, vol. 15, p. 211, 1926; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, pp. 224–225, 1939. (Genotype, *Stomoxys tenera* Wiedemann, monobasic.)

Lesciomima Brauer and Bergenstamm, Denkschr. Akad. Wiss. Wien., vol. 58, p. 372, 1891 (lapsus).

Front slightly convex; vertex a little more than one-third head width, not significantly different in the two sexes; width of frontalia slightly less than that of a parafrontal; epistoma in clypeal plane; parafacial twice as wide at base of antennae as at narrowest point; cheek one-fourth to one-third eye height. Haustellum at least almost head height, very slightly bowed, cylindrical on basal half, then gently constricted and gradually enlarging again toward apex, on apical half pigmented and with setulae arising from pigmented pores; labella small; palpus bowed, approximately as long as third antennal segment, spatulate, longer and much more strongly swollen in female than in male. Third antennal segment 2.5 to 3 times as long as second; hairs of arista one to two times as long as its basal diameter. Lateral postscutellar plates bare. Tarsi somewhat longer than tibiae; claws in both sexes short. Cell R_5 narrowly open to very short-petiolate; vein R_1 setulose to apex, setulae on stigmatic section shorter and more closely set than elsewhere.

Chaetotaxy.—Postocellars not decussate; outer verticals indistinguishable from postocular setulae; ocellars moderately strong; two proclinate and two reclinate frontoorbitals in both sexes, the hind bristle of each series usually distinctly shorter than the fore one; four to six frontals, the anterior two small, the first distinctly below, the second slightly below but almost level with bases of antennae, the first rarely duplicated. Two presutuaral acrosticals, well-developed and distant from suture; three presutural dorsocentrals; three humerals; two postalars; two lateroscutellars, the hind pair not decussate; 1 moderately small pteropleural; three to six hypopleurals. Prosternum bare. Median marginals absent from first abdominal segment and rarely present on second.

Coloration and vestiture.—Head yellow in ground color except upper third to half of lateral occipital plates, which is blackish. Frontalia with scattered pollen showing only from certain angles; head otherwise with dense whitish to yellowish pollen. Parafrontals with a few scattered fine black hairs; a few setulae of varying size around each vibrissa; occiput with black setulae on upper fourth, with softer yellow hairs below. Antenna yellow; third segment with an orange cast basally but infuscated on a large part of its area, the infuscation darker and more extensive from an outer than from an inner aspect. Proboscis yellow, apical third to half of haustellum and the labella brownish; erect hairs of haustellum rather dense, short, one-third to one-half as long as diameter of haustellum; labella with a few scattered black and yellow hairs. Palpi yellow, with scattered short, spinelike black setulae above and a few fine black hairs and one or more preapical setulae below.

Thorax dull black in background, except humeri, propleura, and certain other pleural areas, which are yellow; each inner mesonotal

vitta about as wide as the diameter of a trichopore of a dorsocentral bristle; mesonotum except laterally, upper part of humerus, and scutellum black setulose, thorax otherwise with softer yellow hairs. Squamae and halteres yellow. Legs mainly yellow; tarsi, however, either entirely black or infuscated apically and appearing black under low magnification by virtue of the density of their black setulae; coxae whitish pollinose, legs otherwise without pollen; coxae mainly and posteroventral surface of middle and hind femora on basal part yellowish pilose, legs otherwise with black setulae.

Abdomen yellow, usually orange-tinged or infuscated on apical segments, and more or less marked with black, blackish, or brown; third and fourth tergites white-pollinose at base ventrally and laterally, this pollen showing from dorsal aspect at least as small posterior triangles laterally on the segments; ventral portions of first tergite with soft yellow pile, abdomen otherwise with rather dense black setulae.

KEY TO THE SPECIES OF LESKIOMIMA

1. Haustellum 1 to 1.25 times head height; one pair of discoscutellars[5] and no apicoscutellars 2
   Haustellum 1.5 times head height; no discoscutellars; one pair of small parallel apicoscutellars ..... australis Townsend
2. Black ground color of thorax extended to include sides of mesonotum and base of scutellum; pollen of head and thorax entirely whitish to cinereous ..... cinerea, new species
   Sides of mesonotum and entire scutellum yellow in ground color; parafrontals and mesonotum with yellow pollen ..... tenera (Wiedemann)

LESKIOMIMA AUSTRALIS Townsend

Leskiomima australis TOWNSEND, Rev. Chilena Hist. Nat., vol. 32, p. 368, 1928; Manual of myiology, pt. 9, p. 225, 1939.

Male.—Length, 6 mm. Lateral occipital plates blackish on upper third; pollen of head mainly whitish, becoming yellow on parafrontals, upper third of occipital orbits and lateral occipital plates, area surrounding cheek groove, and narrow inner margin of parafacial. Infuscated area of third antennal segment reaching almost to base dorsally and to basal third ventrally; first segment of arista yellow, second and base of third infuscated, the third otherwise yellow on its basal third to half, beyond that black; hairs of arista concolorous. Haustellum about 1.5 times head height. Palpus below with one longer seta near apex and one at beginning of apical fourth. Five frontals.

Thorax with humeri, scutellum, sides of mesonotum, propleura, upper parts of mesopleura, and other pleural areas of varying extent

[5] In rare instances the discoscutellars are set back rather far and may be confused with apicoscutellars.

along suture, yellow in background; tarsi yellowish basally. No discoscutellars; 1 apicoscutellar, small, convergent.

Abdomen with a broad median vitta, broadly interrupted at bases of segments, extending from apex of segment 1 to middle of segment 4; a pair of large black spots on middle of segment 3 laterally and appearing as triangles from either dorsal or ventral aspect, the entire figure, if integument were spread out in a plane, being diamond-shaped; small brownish connections between lateral markings and median vitta; apex of abdomen beyond these spots brownish yellow, the apical part of the vitta not very clearly apparent. Third and fourth tergites narrowly pollinose at base dorsally as well as ventrally.

Holotype.—Male, Itaquaquecetuba, São Paulo, Brazil, U.S.N.M. No. 57289.

The above description was based on the type, the only specimen of this species which I have seen. In the original description, the type was erroneously stated to be a female; for a possible explanation of this, see discussion under *Leskiomima tenera* (Wiedemann), page 103.

LESKIOMIMA CINEREA, new species

Length, 5 mm. Lateral occipital plates blackish on upper half; pollen of head whitish with a slightly yellowish cast, that of parafrontals not noticeably different from that of rest of head. Haustellum 1 to 1.25 times head height. Third segment of antenna with infuscated area, from outer aspect, extending from apex almost to arista dorsally and about halfway ventrally; arista in male entirely black, in female with the first segment and the basal half of the third segment, beyond its thickened portion, yellow; hairs of arista concolorous with background. Palpus pale yellow; one or two stronger ventral setulae near apex and a longer one about one-third distance from the apex. Five frontals.

Thorax with humeri, broad apical and lateral margins of scutellum, propleura, and mesopleura immediately below anterior spiracles, yellow; thoracic pollen cinereous. Hind tarsi black. One discoscutellar; no apicoscutellars.

Abdomen orange-yellow; a subquadrate brownish median spot at apex of segment 1; in the female, this is followed by indefinitely bordered brownish areas forming a median vitta that reaches to apex of segment 3, briefly interrupted at bases of segments, and expanding on segments 2 and 3 into complete posterior margins dorsally; in the male these areas are more reduced and form median triangles on about the apical two-thirds each of segments 2 and 3 and round spots at the bases of the marginal bristles of segment 3.

Types.—Holotype, male, Orlando, Fla., January 1930 (D. J. Nicholson), on *Erechtites heiracifolia*, U.S.N.M. No. 57290. Allotype, female, Orlando, Fla., January 15, 1930 (Nicholson), on *Triphasia trifolia.*

LESKIOMIMA TENERA (Wiedemann)

FIGURE 3, *a*, *c*

Stomoxys tenera WIEDEMANN, Aussereuropaische zweiflügelige Insekten, vol. 1, p. 251, 1830.

Leskiomima tenera (Wiedemann) BRAUER and BERGENSTAMM, Denkschr. Akad. Wiss. Wien, vol. 58, p. 372, 1891; vol. 60, p. 133, 1893.—COQUILLETT, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 67, 1897 (partim).—SMITH, Rep. New Jersey State Mus. for 1909, p. 777, 1910.—JOHNSON, Bull. Amer. Mus. Nat. Hist., vol. 32, p. 71, 1913; vol. 41, p. 436, 1919.—BRITTON, Connecticut State Geol. and Nat. Hist. Surv. Bull. 31, p. 191, 1920.—GREENE, Proc. U. S. Nat. Mus., vol. 60, p. 21, fig. 42, 1922 (puparium described and illustrated).—GILL, U. S. Dept. Agr. Farmers' Bull. 1364, p. 23, 1924.—ALDRICH, Ann. Ent. Soc. Amer., vol. 18, p. 121, 1925.—JOHNSON, Boston Soc. Nat. Hist. Occ. Papers, vol. 7, p. 190, 1925.—GOWDEY, Dept. Agr. Jamaica Ent. Bull. 4, pt. 1, p. 81, 1926.—WEST, *in* Leonard, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 810, 1928.—ALLEN, Ann. Ent. Soc. Amer., vol. 22, p. 683, 1929.—HAEUSSLER, Journ. Agr. Res., vol. 41, p. 367, 1930 (misidentification?).—TOWNSEND, Rev. Ent., vol. 1, p. 90, 1931.—BRIMLEY, Insects of North Carolina, p. 359, 1938.

Leskiomera tenera (Wiedemann) BANKS, Ent. News, vol. 23, p. 110, 1912 (lapsus).

Length, 5.5 to 7.5 mm. Lateral occipital plates black on upper third; pollen of head whitish for the most part, yellowish, however, on parafrontals, upper third of occipital orbits and of occiput, areas surrounding cheek groove, and inner margin of parafacial. Third antennal segment with infuscated area, from outer aspect, extending from apex almost to arista dorsally and about halfway ventrally; first segment of arista yellow; second and base of third infuscated, the third otherwise yellow on its basal third or half, its apical part black; aristal hairs concolorous with background. Haustellum 1 to 1.25 times head height. Palpus with two or three longer preapical ventral setulae. Four to six frontals.

Thorax with humeri, scutellum, sides of mesonotum, propleura, upper parts of mesopleura and other pleural areas of varying extent, yellow in background. Tarsi more or less yellow basally. One discoscutellar; no apicoscutellars.

Abdomen with segments 3 and 4 somewhat orange-tinged and with small black spots on sides posteriorly; somewhat similar spots may occur in a like position on segment 3 and in a medioapical position on any tergite.

Type.—Female, in the Natural History Museum in Vienna. In the original description, Wiedemann gave no type locality; Aldrich and Townsend, who later examined the type, stated that it bears an elaborate capital F in script, "Coll. Winthem" and "Type."

The known geographical distribution of this species extends from Nova Scotia and Quebec to Florida, Illinois, and Texas. It has been recorded in literature from New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, District of

Columbia, Virginia, North Carolina, Mississippi, and Illinois. Additional records that will extend its range beyond those previously published are Ohio; Berthierville, Quebec, July 2 to 9, 1940 (L. Daviault); Petite Rivière, Nova Scotia, August 9, 1936 (J. McDunnough); Charlotte, Maine, July 12, 1933; Opelousas, La., April 1897; Kerrville, Tex., April 12, 1907; College Station, Tex., April to November (H. J. Reinhard).

Records from Jamaica may apply to this or to another species. Curran [6] recorded it from British Guiana as *Myobia* (*Leskiomima*) *tenera* Wiedemann, but his statement, "The first vein is bare, the third with two or three bristles basally," shows clearly that the record is based on a misidentification. Some of the records for states listed above may be based on misidentifications, although all are within the range of the species as indicated by specimens I have examined.

Adults have been collected on the flowers of *Ceanothus* by Banks. Larvae have been reared from the following hosts, all Lepidoptera: *Desmia funeralis* (Hübner) at Washington, D. C. (J. F. Strauss); *Carpocapsa pomonella* (Linnaeus) at Carbondale, Ill.; and *Acrobasis juglandis* (LeBaron) (*A. nebulella* auctt., not Riley) at Monticello, Fla. (J. B. McGill), and Wiggins, Miss. (Allen, 1929), the latter record, according to Allen, being under circumstances which would cast some doubt upon the host relationship. Haeussler (1930) recorded it as a parasite of *Grapholitha molesta* (Busck), but a specimen in the United States National Museum, upon which this record may have been based, is *Leskiella brevirostris* James.

Both Aldrich and Townsend mistook the males of *Leskiella* for those of *Leskiomima tenera*. Aldrich [7] says of *Leskiomima* that "the male has long claws and pulvilli, and has no orbitals," and Townsend [8] makes use of the same characters in his generic description. This failure to associate the sexes properly may have been responsible for Townsend's error in describing the male of *Leskiomima australis* as a female. The male genitalia are small, but are apparent as such even when unspread.

4. Genus DEJEANIOPALPUS Townsend

Dejeaniopalpus Townsend, Proc. U. S. Nat. Mus., vol. 51, p. 312, 1916; Rev. Mus. Paulista, vol. 15, p. 212, 1927; Manual of myiology, pt. 4, p. 65, 1936, and pt. 9, pp. 214–215, 1939. (Genotype, *Dejeaniopalpus texensis* Townsend, monobasic.)

Genea Rondani (partim), Aldrich, Ent. News, vol. 35, pp. 210–214, 1924.

Dejeaniopsis Johnson, Proc. Boston Soc. Nat. Hist., vol. 7, p. 190, 1925 (lapsus).

Front moderately convex, vertex about one-third head width, slightly less in the male; frontalia as wide as average width of a parafrontal;

[6] Bull. Amer. Mus. Nat. Hist., vol. 66, p. 508, 1934.
[7] Ent. News, vol. 35, p. 211, 1924.
[8] Manual of myiology, pt. 9, pp. 224–225, 1939.

epistoma distinctly warped; cheek 0.22 to 0.30 eye height. Haustellum 0.8 to 1.5 head height; labella small; palpus bowed, spatulate, 1.5 to 1.75 as long as third antennal segment, when in normal position extending one-third to one-half its length beyond oral margin. Third antennal segment two to three times as long as second, its length twice to three times width. Lateral postscutellar plates bare. Tarsi longer than tibiae; claws in both sexes short. Wing with cell R_5 narrowly open; R_1 with setulae to apex, those in the stigmatic section more closely set than elsewhere.

Chaetotaxy.—Outer verticals well-developed in both sexes; ocellars moderately strong, normally two proclinate frontoorbitals, hind one somewhat the weaker; one strong and sometimes one weak reclinate frontoorbital; five to eight frontals, of which one or two weak ones are located distinctly below and one almost opposite and slightly below, antennal base. Presutural acrosticals sometimes absent, more commonly one or two pairs present and remote from suture; 3 presutural dorsocentrals; hind preintraalar absent or weak; three humerals; two lateroscutellars, with sometimes an adventitious third; no apicoscutellars, except abnormally; discoscutellars absent, or one or two weak pairs present; one short pteropleural; three to five hypopleurals; three, rarely two, sternopleurals. Prosternum bare.

Coloration and vestiture.—Head mainly yellow in ground color. Pollen of frontalia sparse, whitish, distinguishable only from front view; that of head otherwise dense, yellowish above, more or less whitish below. Parafrontalia bare or with a few scattered black hairs; a few black setulae of varying size on facial near vibrissa. First and second antennal segments with short black setulae dorsally and apically. Palpi yellow, clothed with scattered, very short, sharp, black setulae. Thorax black and yellow in ground color, with dense whitish to yellowish pollen; black hairs on dorsum, with black and soft yellow hairs laterally. Squamae and halteres yellow. Legs yellow, tarsi more or less blackish or brown; coxae with whitish pollen, legs otherwise without pollen. Abdomen black-haired above, with black and soft yellow hairs below.

KEYS TO THE SPECIES OF DEJEANIOPALPUS

1. Haustellum slender, 1.5 times as long as head height; hairs of arista distinctly longer than its maximum diameter_____ tenuirostris, new species
   Haustellum moderately robust, not so long as head height; hairs of arista no longer than its maximum diameter_____ 2
2. Antenna of moderate size, the third segment being about 0.45 head height; palpus of female swollen; mesopleura yellow in ground color; abdomen largely yellow, the segments with black markings, which are at least narrowly isolated from those on adjoining segments; first abdominal segment with median marginals_____ 3
   Antenna rather small, the third segment being about 0.35 head height; palpus not swollen in either sex; mesopleura largely black in ground color; abdomen

with a continuous black vitta running from base to apex, or largely black; first abdominal segment without median marginals; parafacial about twice as wide at base of antenna as at narrowest point___ brasiliensis Townsend

3. Black spots of abdomen small and inconspicuous, the median ones on segments 2 and 3 usually not more than one-third length of respective segment; parafacial almost or quite three times as wide at base of antenna as at narrowest point _____ texensis Townsend

Black spots of abdomen conspicuous, the median ones on segments 2 and 3 almost reaching base of respective segment; parafacial about twice as wide at base of antenna as at narrowest point_____ longipalpis (Van der Wulp)

DEJEANIOPALPUS TENUIROSTRIS, new species

Length, 7 mm. Minimum width of parafacial about two-fifths that at base of antennae. Vertex about two-sevenths head width. Lateral occipital plates blackish on upper two-fifths. Pollen of head yellow on parafrontals, whitish with a yellowish tinge elsewhere; pile of occiput concolorous with background. Antenna yellow; third segment with an orange cast basally, otherwise infuscated, more extensively outwardly than inwardly, the infuscated area reaching almost to arista dorsally and about halfway to the base ventrally; length of third segment about 0.45 head height, 0.55 length of palpus, and 2.8 length of second; arista yellow, becoming infuscated on its thinner portion, its hairs 1.5 to 2 times its maximum diameter. Proboscis chiefly yellow, apical half of haustellum and labella brownish; haustellum 1.5 head height, slender, attenuated on apical half. Palpus yellow, slender but as thick as the haustellum, with two outstanding apical setulae and one or two ventral ones on apical third; length of palpus about 0.8 head height. One reclinate frontoorbital.

Thorax yellow in background, the mesonotum except broad lateral margins and the base of the scutellum, however, blackish; inner mesonotal vitta about as wide as the trichopore of a dorsocentral bristle. Two presutural acrosticals; anterior presutural supraalar present but weak; 1 discoscutellar, set well toward apex of scutellum. Tarsi mainly blackish, the bases of the front and middle basitarsi, however, yellowish; hair of coxae and some hair at bases of femora soft, whitish, remaining hair of legs coarse, black. Wing with cross vein r-m opposite middle of stigma; part of vein M_1 beyond cubitulus distant from posterior margin of wing by less than half minimum width of cell R_5.

Abdomen yellow, becoming somewhat orange-tinged toward apex; second segment with a rounded black spot medially on apical third and a small black spot at apex on each side; third segment with a triangular median black spot on the apical half; third and fourth segments each with a prominent rounded black spot at apex on each side. Pile of first tergite ventrally mostly soft, whitish; abdomen otherwise clothed with coarse, black hairs. Ventral aspect of tergites with a trace of scattered, whitish pollen.

Holotype.—Male, Tapachula, Mexico, August 17–19, 1943 (F. M. Snyder), American Museum of Natural History.

DEJEANIOPALPUS BRASILIENSIS Townsend

Dejeaniopalpus brasiliensis TOWNSEND, Rev. Chilena Hist. Nat., vol. 32, p. 368, 1928.

Length, 6.5 to 7.5 mm. Head mainly yellow, upper half of occiput, ocellar triangle, and parafrontals above anterior reclinate frontoorbitals black; pollen yellowish on upper part of occiput and on parafrontals, otherwise whitish; occiput with black hairs above, soft yellow pile below. Width of parafacial at narrowest point about half that at base of antenna. Antenna largely orange yellow, third segment, however, blackish beyond arista; third segment 2.5 as long as second in male, 2.0 in female, about 0.35 height of head and 0.6 length of palpus; arista yellow on first and second segments, blackish on third, its hairs about as long as its maximum diameter. Proboscis with rostrum brown, haustellum yellow, becoming brown toward apex, and labella brown; haustellum about 0.9 head height, straight, cylindrical, somewhat attenuated on penultimate fourth, with short black erect hairs, labella with one or two long black hairs at apex, otherwise with yellowish hairs. Palpus alike in both sexes, 0.6 as long as height of head, no thicker than haustellum; one or two outstanding setulae near apex ventrally and an especially long one, about twice maximum diameter of palpus, at or beyond middle ventrally; a few soft black hairs below at base. Two reclinate frontoorbitals, the posterior one small.

Ground color of thorax black, that of humeri, propleura, and scutellum except base yellow; pollen yellow on mesonotum and humeri, whitish on pleura; inner mesonotal vitta definitely wider than diameter of a trichopore of a dorsocentral bristle. Anterior presutural supraalar present but weak; two relatively strong presutural acrosticals; no discoscutellars. Tarsi brownish to black; anterior surface of coxae with soft yellow hair, legs otherwise with coarse black hair. Cross vein r-m opposite last fourth of stigma; part of vein M_1 beyond cubitulus distant from posterior margin by three-fourths or more width of cell R_5.

Abdomen in the male yellow, somewhat darker on last two segments, with a median black vitta about as wide as distance between hind lateroscutellars or, on intermediate segments, somewhat broader, running from base of first almost to extreme apex of fourth segment; large lateral black spots on segments 3 and 4, a smaller one on segment 2, and brownish indications of one on segment 1; intermediate segments with margins of tergites next to sternites brownish; in the female these markings are expanded so that the median vitta and narrow posterior border of segment 1, the dorsal aspect of the following tergites

except a small area on each side of segment 2 basally, the broad apices of segments 3 and 4 ventrally, and the inner margins, next to the sternites, of tergites 2 to 4 ventrally, are black. Bases of segments 2 to 4, dorsally and ventrally, with dense, whitish pollen, the areas broader and more conspicuous in the female; abdomen otherwise shining. No median marginals on segment 1.

Types.—Male, Itaquaquecetuba, São Paulo, Brazil, November 20, on flowers of *Cordia curassavica;* female, same locality, September 15, on foliage. The male is here designated the lectotype, U.S.N.M. No. 57291.

The description is based on the types.

DEJEANIOPALPUS TEXENSIS Townsend

Dejeaniopalpus texensis Townsend, Proc. U. S. Nat. Mus., vol. 51, p. 312, 1916; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, p. 214, 1939.

Leskiomima tenera (Wiedemann) Coquillett, U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 67, 1897 (partim) (not Wiedemann).

Genea texensis (Townsend) Aldrich, Ent. News, vol. 35, pp. 212–213, 1924.—Johnson, Boston Soc. Nat. Hist. Occ. Papers, vol. 7, p. 190, 1925; Biological survey Mount Desert region, I, Insect fauna, p. 199, 1927.—West, *in* Leonard, Cornell Univ. Agr. Exp. Stat. Mem. 101, p. 810, 1928.—Proctor, Biological survey Mount Desert region, IV, Insect fauna, p. 377, 1938.

Length, 4.5 to 7 mm. Parafacial narrow below, minimum width one-third that at base of antenna. Lateral occipital plates blackish on upper two-fifths. Pollen of head yellow on parafrontals, whitish with a yellowish tinge elsewhere; pile of occiput concolorous with background. Antenna yellow; third segment with an orange cast basally, otherwise infuscated, more extensively outwardly than inwardly, the infuscated area outwardly reaching almost to arista dorsally and about halfway to the base ventrally; length of third segment about 0.45 head height, 0.67 length of palpus, and 2.5 to 3 times length of second; arista yellow, becoming somewhat infuscated on approximately apical half, its hairs concolorous and about as long as its maximum diameter. Proboscis yellow, labella reddish yellow; a few long blackish and yellowish hairs at apex of haustellum and on labella; haustellum about 0.8 head height, straight, cylindrical, somewhat attenuated on penultimate fourth. Palpus yellow; three or four outstanding setulae at apex and one or two on ventral surface of apical half; length of palpus 0.65 to 0.70 head height; in the female enlarged on apical three-fifths, with maximum diameter greater than that of haustellum; in the male slightly enlarged, its maximum diameter subequal to that of haustellum. One reclinate frontoorbital.

Thorax yellow in background, the mesonotum except broad lateral margins and the base of the scutellum, however, blackish; lower pleural sclerites sometimes darkened in the middle; inner mesonotal vitta about

as wide as the diameter of a trichopore of a dorsocentral bristle. Presutural acrosticals absent or one or two weak pairs present; anterior presutural supraalar weak or absent; one or two weak discoscutellars; scutellum sometimes with adventitious bristles. Tarsi beyond basitarsus blackish brown; ventral and posteroventral surfaces of femora and anterior surface of coxae with soft yellowish pile; legs otherwise black-haired. Wing with cross vein r-m usually opposite middle of stigma; part of vein M_1 beyond cubitulus distant from posterior margin of wing by less than half maximum width of cell R_5.

Abdomen yellow, usually becoming orange-tinged on third and fourth segments; second and third segments medially and usually second to fourth segments laterally each with a small brownish to blackish spot; abdomen with thin whitish pollen below and none above. A pair of small median marginals on first segment. Pile on ventral surface of first tergite soft, yellow; hair of abdomen otherwise black.

Holotype.—Female, Texas, U.S.N.M. No. 20039.

The known distribution of this species extends from Quebec to Virginia and Texas. It has been recorded in literature from Maine, Vermont, Connecticut, New York, Pennsylvania, Virginia, and Texas; there are also specimens in the United States National Museum from Maryland and the District of Columbia. I have also seen specimens from Abbotsford, Quebec, July 29 (G. Shewell), Canadian National Collection.

This species has been reared from an unidentified leaf roller on *Helianthus* at Arendtsville, Pa., August 20, 1927, by S. W. Frost; from "*Botys* sp."; and from *Desmia funeralis* (Hübner) at Cape Henry, Va., by August Busck, and at Washington, D. C., Quaintance No. 5542.

DEJEANIOPALPUS LONGIPALPIS (Van der Wulp), new combination

Myobia longipalpis VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2, p. 138, 1890.

Genea longipalpis (Van der Wulp) ALDRICH, Ent. News, vol. 30, p. 214, 1924.

Until a male can positively be referred to this species, its generic status must remain somewhat uncertain. I have seen only a female, in the United States National Museum, which was determined as this species by both Townsend and Aldrich. It agrees with the original description, so far as that goes, and, though no mention is made of certain essential characters, I assume that the determination is correct. The characters, as nearly as can be judged from the female, are those of *Dejeaniopalpus* rather than of *Genea*. The vertex is 0.31 the head width. My description of *D. texensis* will apply to this specimen, with the exceptions indicated in the key.

Types.—Two females, from Chilpancingo, Guerrero, Mexico, presumably in the British Museum (Natural History).

The above remarks were based on one female San Rafael, Veracruz, Mexico, March 8 (Townsend).

5. Genus GENEA Rondani

Genea Rondani, Nuovi Ann. Sci. Nat. Bologna, ser. 3, vol. 2, pp. 172–174, 1850.—Aldrich, Ent. News, vol. 25, pp. 210–214, 1924.—Townsend, Rev. Mus. Paulista, vol. 15, p. 212, 1927; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, pp. 218–219, 1939. (Genotype, *Genea maculiventris* Rondani, monobasic.)

Geneopsis Townsend, Rev. Mus. Paulista, vol. 15, p. 212, 1927; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, pp. 221–222, 1939. (Genotype, *Geneopsis major* Townsend, monobasic. New synonymy.)

Geneoglossa Townsend, Rev. Ent., vol. 5, p. 225, 1935; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, pp. 220–221, 1939. (Genotype, *Geneoglossa glossata* Townsend, monobasic, New synonymy.)

A careful study of these three genera, including the holotypes of the type species of the two reduced to synonymy, reveals no differences that might be considered generic. In his key to the Leskiini, Townsend uses the length of the haustellum, the strength of the ocellars, and size of the squamae, the presence or absence of median marginals on the first abdominal segment, and the length of the front tarsus of the female, as bases for his separation. It is significant that these are all relative characters, and when they are measured with a micrometer the supposed differences become smaller or vanish.

The following characters are shared by all members of the genus known to me:

Front moderately convex; vertex one-fourth to two-sevenths head width in female, one-fifth to one-sixth in male; frontalia as wide as average width of a parafrontal; clypeus distinctly warped forward; cheek one-fifth to one-fourth eye height. Third antennal segment 2.7 to 3.3 as long as second and 2.5 to 3.5 as long as its maximum width; hairs of arista somewhat longer than maximum aristal diameter. Lateral postscutellar plates bare. Tarsi longer than tibiae; claws in female short, in male elongated. Cell R_5 narrowly open. Vein R_1 with setulae to apex, those on stigmatal area sometimes more closely set.

Chaetotaxy.—Inner verticals decussate; outer verticals in female (except in *gracilis*, new species) well-developed and one-half to two-thirds length of inner verticals, in male sometimes differentiated, but weak; ocellars weak, frontoorbitals lacking in male, two proclinate and one or two reclinate in female; six to nine frontals, the anterior two or three below antennal bases. Two presutural acrosticals; three presutural dorsocentrals; hind presutural intraalar sometimes present, though weak; three humerals; two lateroscutellars; one to three discoscutellars, the hind pair placed well back and almost in the position of an apicoscutellar; no true apicoscutellars; one pteropleural; two to seven hypopleurals.

KEY TO THE SPECIES OF GENEA

1. Third abdominal segment with a transverse black band, which occupies at least its posterior fourth, usually its posterior third to half; haustellum at least as long as head height 2
   Third abdominal segment with a median posterior black spot, but without a complete cross band 3
2. Robust species; median marginals on first and second abdominal segments; palpus 1.7 to 2.0 length of third antennal segment; outer verticals clearly differentiated ..... major (Townsend)
   Slender species; no median marginals on either first or second abdominal segment; palpus about 1.3 length of third antennal segment; outer verticals hardly differentiated ..... gracilis, new species
3. Haustellum about 0.75 head height, cylindrical and straight; pollen of mesonotum deep yellow, almost golden ..... aurea, new species
   Haustellum at least head height, attenuated and gently curved backward on apical half; pollen of mesonotum with more of a whitish cast 4
4. Haustellum not more than 1.3 head height ..... trifaria (Wiedemann)
   Haustellum about 1.5 to 1.6 head height ..... glossata (Townsend)

GENEA MAJOR (Townsend), new combination

Geneopsis major TOWNSEND, Rev. Mus. Paulista, vol. 15, p. 311, 1927; Manual of myiology, pt. 4, p. 65, 1936; pt. 9, p. 221, 1939.

Length, 8 to 9 mm. Head in ground color yellow except lateral occipital plates, which are blackish on approximately upper half; pollen brownish on frontalia, golden on parafrontals, pale yellowish on face and occiput. Hairs of parafrontals black, very sparse; those of upper half of occiput black, of lower half pale yellow. Outer verticals present in both sexes. Antenna yellow, third segment infuscated except on basal two-fifths ventrally and inwardly; arista brownish yellow, blackish on its thinner part, the hairs concolorous. Haustellum cylindrical, distinctly constricted on apical half, most slender on penultimate fourth, about 1.1 head height; color yellowish, becoming brownish toward apex. Palpus 1.75 (in female) to 2.0 (in male) length of third antennal segment; setulae black.

Mesonotum, except humeri and sides, and certain pleural areas of variable extent, black in ground color, the black strongly obscured by pollen but tending to show through more noticeably than in some other members of this and related genera; pollen of mesonotum, scutellum, and upper parts of pleura golden, of rest of thorax pale yellow to whitish; inner vitta of mesonotum somewhat broader than diameter of a trichopore of a dorsocentral bristle. Hairs of mesonotum, scutellum, and upperparts of humeri coarse, black, those of lower parts of humeri and pleura rather fine, yellowish. Legs yellow, tarsi blackish; coxae whitish pollinose, legs otherwise without pollen; some whitish hairs on coxae and at base of posteroventral surface of femora, legs otherwise black-haired. Wings hyaline; R_1 with setulae on

stigmatal area more closely set than elsewhere. Squamae and halteres yellow.

Abdomen with a median black vitta extending from near base of first to apex of fourth segment, very narrowly interrupted at anterior margins of segments, on third segment broadening into a transverse band that occupies about apical third to half of dorsal surface of tergite; sides of segments 2 and 4 with black spots posteriorly which on segment 2 and perhaps also on segment 4 may be united with the median vitta. Most of hairs of segment 1 ventrally, and some also on segment 2 ventrally, yellowish, those of rest of abdomen black.

Types.—Male, Itaquaquecetuba, São Paulo, Brazil, October 26; female, Itaquaquecetuba, November 20. The male is here designated the lectotype, U.S.N.M. No. 57294.

The description is based on the types, on a female, Itaquaquecetuba, São Paulo, Brazil, May 25 (C. H. T. Townsend), and on a male, Villarica, Paraguay, November 1936 (F. Schade).

GENEA GRACILIS, new species

Length, 5 to 7 mm. Head in ground color yellow except lateral occipital plates, which are blackish on approximately upper half; pollen brownish on frontalia, golden on parafrontals, pale yellowish on face and occiput. Each parafrontal with a few scattered fine black hairs; occiput largely with fine yellow hair but with some coarser black hair above, more in the female than in the male. Outer verticals not differentiated in either sex. Antenna yellow, third segment infuscated except on basal third ventrally and inwardly; third segment rather slender; arista yellow on first two segments and thickened part of third, except its base, third otherwise brown; hairs unusually long for this genus, being about three times maximum diameter of arista. Haustellum slender, cylindrical, constricted on apical half, very slightly bowed backward, 1.3 to 1.5 head height; color yellow, brownish to blackish on apical half. Palpus about 1.3 length of third antennal segment; setulae black, mostly short, 1 outstanding preapical and 1 outstanding median one on ventral surface. Female with 2 reclinate frontoorbitals.

Ground color of thorax chiefly black, that of notopleura, humeri, scutellum, and propleura, however, yellow; pollen of mesonotum, scutellum, and upper parts of pleura yellow, that of rest of pleura whitish; inner vitta of mesonotum about as broad as diameter of trichopore of a dorsocentral bristle. Hairs of mesonotum, scutellum, and upper parts of humeri coarse, black, those of lower parts of humeri and pleura rather fine, yellowish. Hind presutural acrostical much stronger than fore one. Legs mainly yellow; hind femur brownish near apex; hind tibia blackish; all tarsi black; coxae whitish pollinose, legs otherwise without pollen; hairs of coxae and a few near base on

posteroventral surface of hind femur yellowish, legs otherwise black-haired. Wings hyaline, with a slight grayish tinge; R_1 with setulae on stigmatal area more closely set than elsewhere. Squamae and halteres yellow.

Abdomen yellow, becoming reddish yellow toward apex, marked with black as follows: a median rounded spot and sometimes a lateral spot on each side, on tergite 1; a triangular median spot, reaching basal third of segment, expanded into a complete posterior band dorsally and extending over the sides ventrally, but not reaching the sternite, on tergite 2; a triangular median spot reaching almost to base of segment, expanded into a transverse band that occupies posterior fourth to half of tergite dorsally and extends onto the ventral surface to border broadly on the sternite, on tergite 3; and a posterior spot on each side that expands broadly into a posterior margin ventrally but not dorsally or tergite 4. Some soft yellowish hair ventrally on tergite 1; abdomen otherwise with coarse black hair. Tergites shining dorsally, with scattered yellowish pollen ventrally; tergites 2 to 4 ventrally each with anterior margin of thick white pollen, which shows from dorsal view as small side spots on segments 3 and 4. No median marginals on first two abdominal segments.

Types.—Holotype, male, Nova Teutonia, Brazil, May 25, 1939 (Fritz Plaumann), American Museum of Natural History. Allotype, female, same data. Paratypes, two females, same data but May 22 and 31, 1939, and one male, same data but May 31, 1939. Male and one female paratype in the United States National Museum.

GENEA AUREA, new species

Genea anālis (Say) ALDRICH, Ent. News, vol. 25, pp. 211–212, 1924 (not *Dexia anālis* Say, Journ. Acad. Nat. Sci. Philadelphia, vol. 6, p. 177, 1829).

Length, 6 to 9 mm. Head in ground color yellow, the lateral occipital plates black on upper third or less; pollen brownish on frontalia, clear yellow on greatest area of parafrontals, whitish with a yellowish tinge elsewhere. Hairs of occiput mostly yellow; a few black hairs above; only very scattered black setulae on parafrontals and near vibrissae. No distinct outer verticals in male. Antenna yellow, third segment brownish on apical half, brown coloration more extensive dorsally and outwardly; arista yellow, brownish on its thinner part, the hairs concolorous. Haustellum cylindrical, slightly tapering apically, 0.7 to 0.75 head height; color yellowish, at base tending toward whitish in some specimens. Palpus rather robust, as thick as haustellum in female, more slender in male; normally 1.4 to 1.6 length of third antennal segment, sometimes a little shorter in the male or a little longer in the female; setulae black, a few pale hairs below at base.

Mesonotum except humeri and sides black in ground color; parts of pleura a very dilute blackish, scarcely evident; pollen of mesonotum,

scutellum, and uppermost parts of pleura deep yellow, almost golden, remaining pollen of pleura whitish with a slight yellow tinge; inner vitta of mesonotum as broad as diameter of a trichopore of a dorsocentral bristle. Hairs of mesonotum (except notopleura), scutellum, and upper parts of humeri coarse, black; those of thorax otherwise fine, yellowish. Legs yellow, tarsi becoming brownish apically; coxae whitish pollinose, legs otherwise without pollen; coxae and posterior and posteroventral surfaces of femora chiefly whitish pilose, legs otherwise with black stiff hairs. Wings hyaline; R_4 with setulae uniformly spaced or but slightly more closely set in the stigmatal region. Squamae and halteres yellow.

Abdomen yellow; second and third segments, sometimes also first, each with a median apical black spot dorsally; third, fourth, and sometimes second, with a small apical spot on each side; the lateral spots, in particular, however, show a tendency to disappear. Abdomen dorsally shining, ventrally with inconspicuous whitish pollen visible in an oblique light. Hairs of first segment ventrally mostly pale; those of rest of abdomen black. First segment with weak though distinct median marginals.

Types.—Holotype, male, Chain Bridge, Va., August 3, 1923 (J. M. Aldrich), U.S.N.M. No. 57292. Allotype, female, Plummers Island, Md., September 29, 1912 (P. R. Meyers). Paratypes: one female, Chain Bridge, Va., June 25, 1923 (J. M. Aldrich); one female, Plummers Island, Md., August 18, 1912 (J. R. Malloch); one female, Lafayette, Ind., September 9, 1916 (J. M. Aldrich); one female, Atlanta, Ga., June 30, 1930 (P. W. Fattig); one male, one female, Monticello, Fla., July 27, 1914 (A. I. Fabis), Quaintance No. 10573, "bred from *T. subcanalis* Walk.," August 24 and 21, 1914 [all U.S.N.M.]; one female, Manhattan, Kans., October 1924; three females, Babylon, Long Island, N. Y., June 28, 1935, and July 2, 1936 (Blanton and Borders), and June 25, 1935 (F. S. Blanton) [H. J. Reinhard Collection].

This species has been reared from *Tetralopha subcanalis* (Walker).

The best disposition of *Dexia analis* Say is to place it, as Smith[9] suggested, among the unidentifiable species. Coquillett[10] considered it a synonym of, and therefore holding priority over, his *Myobia depile* (=*Leskiopalpus depilis* (Coquillett)). Aldrich, however, disagreed with Coquillett's interpretation of *Dexia analis*, apparently on the strength of Say's statement that "the proboscis and palpi are much elongated."

I believe, however, that Coquillett was more probably right than Aldrich. Say's description, in part, reads "proboscis black, yellow at tip; thorax black, with a somewhat golden reflection; a dull

[9] Proc. Ent. Soc. Washington, vol. 19, p. 125, 1917.
[10] U. S. Dept. Agr., Div. Ent., Tech. Bull. 7, p. 67, 1897.

yellow line on each side, passing over the origin of the wings . . . abdomen pale yellow, tips fuscous." The coloration of the proboscis agrees with that of *Leskiomima depilis* and sharply disagrees with that of *Genea aurea*. Under low magnification the thorax of *L. depilis* might well be seen as Say described it, and the abdomen tends to be darkened at the apex; in *G. aurea*, on the other hand, the heavily dusted thorax, with its paler ground color, would hardly appear that way, and the abdomen is yellow, with median posterior spots on the individual segments. Moreover, in *L. depilis* the palpi are decidedly elongated in comparison with those of *Dexia vertebrata* Say (*Zelia vertebrata* (Say)) described in the same paper as *D. analis*. At best, some element of doubt concerning the identity of Say's species remains, and since this can never be resolved by examination of a type specimen, it is best to let Coquillett's species, of the identity of which we can be positive, remain.

GENEA TRIFARIA (Wiedemann)

Stomoxys trifaria WIEDEMANN, Analecta Ent., p. 41, 1824; Aussereuropaische zweiflügelige Insecten, vol. 1, pp. 250–251, 1830.

Genea maculiventris RONDANI. Nuovi Ann. Sci. Nat. Bologna, ser. 3, vol. 2, pp. 173–174, 1850.—ALDRICH, Proc. U. S. Nat. Mus., vol. 74, p. 13, 1929.—TOWNSEND, Rev. Ent., vol. 1, p. 90, 1931 (synonymy).

Genea trifaria (Wiedemann) TOWNSEND, Rev. Ent., vol. 1, p. 90, 1931.

Length, 6 to 7 mm. Head in ground color yellow except lateral occipital plates, which are blackish on approximately upper half; pollen brownish on frontalia, yellowish on larger part of parafrontals, and whitish with a yellowish tinge elsewhere. Parafrontals bare or with a very few black hairs; pile of occiput concolorous with ground color, the pale pile being of fine texture. Outer verticals weak in male. Antenna yellow, third segment infuscated except on basal two-fifths ventrally and inwardly; arista yellow, darkened on thinner part, the hairs concolorous. Haustellum 1.1 to 1.3 head height, cylindrical on basal half, then suddenly constricted, the apical part slightly though distinctly bowed backward; color yellow, apical half blackish above, the setulae on that part arising from pigmented pores. Palpus 1.7 to 1.9 length of third antennal segment, as robust as haustellum in female, somewhat more slender in male.

Mesonotum, except humeri and sides, and certain pleural areas of variable extent blackish in ground color; pollen of mesonotum, humeri, and uppermost parts of pleura yellowish, that of remaining parts of pleura whitish; inner vitta of mesonotum as wide as diameter of a trichopore of a dorsocentral bristle. Pile of mesonotum, scutellum, and upper parts of humeri black, of lower parts of humeri and of pleura whitish. Legs yellow, tarsi blackish; coxae whitish pollinose,

legs otherwise without pollen; some whitish hairs on coxae and at base of posteroventral surface of femora, legs otherwise black-haired. Wings hyaline; setulae of vein R_1 more closely set toward apex of vein. Squamae and halteres yellow. Abdomen yellow to yellowish orange; second and third segments, sometimes also first, each with a triangular median apical black spot dorsally; third and fourth, and usually second, segments each with a small apical spot on each side; abdomen wholly shining dorsally, the basal two tergites ventrally with thin whitish pollen visible only in an oblique light. Segment 1 ventrally mostly white-pilose; pile of abdomen otherwise black.

Types.—The type of *S. trifaria*, a male labeled "ex Amer: m: Schmidt," was still extant in the University Zoological Museum, Copenhagen, in 1928, when it was examined by Townsend. *G. maculiventris* was described from a male from Venezuela in the Museo Torinese; Townsend apparently erred in regard both to the sex and location of the type in his twice-published statement, "female Ht in Bologna."

The above description was based on one female, "Piedra B.,"[11] April; two females, Cano Saddle, Gatun Lake, Panama, May 3 and June 1923 (R. C. Shannon); one female, San Esteban, Venezuela, November 1939 (Pablo Anduze) [all U.S.N.M.]; one male, Sangrelaya, Honduras, April 13, 1924 (C. H. Curran); and 1 male, Corocito, Honduras, April 3, 1924 (C. H. Curran) [Amer. Mus. Nat. Hist.].

GENEA GLOSSATA (Townsend), new combination

Geneoglossa glossata TOWNSEND, Rev. Ent., vol. 5, p. 225, 1935.

I can find no significant difference between this species and *G. trifaria* except in the greater length of the haustellum in relation to the head (ratio, 1.6 in type female, 1.5 in two males). The ratio between the length of the palpus and that of the third antennal segment is 1.9 for the female and 2.0 for the males. The two species may be synonymous, but the insufficiency of the material at hand does not at present justify drawing such a conclusion.

Holotype.—Female, Tapera, Pernambuco, Brazil, October 20, 1932, U.S.N.M. No. 57293.

I have also seen a male, Tapera, Pernambuco, September 11, 1935, and a male, "Utingo," May 24, on foliage (Townsend Collection).

[11] According to the editor's footnote in Aldrich, Ent. News, vol. 35, p. 211, 1924, this locality is probably Piedra Blanca, Bolivia, 4 miles west of Corumba, Brazil.

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THE STAPHYLINID BEETLES OF THE CAYMAN ISLANDS

By Richard E. Blackwelder

The Oxford University Biological Expedition to the Cayman Islands (1938) collected several hundred beetles of the family Staphylinidae in the course of extensive light-trap operations. The specimens were made available to me through the kindness of C. B. Lewis, one of the collectors for the expedition and now of the Institute of Jamaica, and Prof. G. D. Hale Carpenter, of Oxford University. It was originally intended to include these records in my "Monograph of the West Indian Beetles of the Family Staphylinidae," [1] but through an oversight records of only three of the species appeared therein. The present report includes the 18 species taken by the Expedition and the two previously reported from the Caymans.

The Staphylinidae of the Cayman Islands must be assumed to be very imperfectly known at the present time. It is to be expected that intensive collecting in various habitats would produce at least 50 species. For example, the three West Indian species of *Cafius* probably occur on the beaches, and others of the widespread species undoubtedly will be found. The present state of our knowledge therefore presents little that may be used in studying the geographical relationships or the origin of the fauna. In general, however, the species are among those which would be expected to occur. The only exceptions are one known otherwise only from Antigua in the Lesser Antilles and one known otherwise only from the United States. The first of

[1] U. S. Nat. Mus. Bull. 182, 658 pp. 1943.

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these may doubtless be explained on the basis of mere failure so far to detect the species on the intervening islands, but the second case is doubtless one of accidental introduction; there is little reason to expect it to be found later in Cuba.

This report is arranged as a supplement to my monograph, to which reference must be made for details of synonymy and distribution as well as for descriptions of the species. A citation to the monograph is given with the original publication to facilitate cross reference. After each locality I have given in parentheses the number of specimens collected.

The material (except as noted) is in the Oxford University Museum and the British Museum (Natural History).

Subfamily Oxytelinae

1. CARPELIMUS CORRECTUS Blackwelder

Carpelimus correctus Blackwelder, U. S. Nat. Mus. Bull. 182, p. 64, 1943.

Grand Cayman: Georgetown (2), Hut Road on north coast (1).
Little Cayman: South Town (1).

Taken in light-traps in May, June, and July 1938. This species was described from Jamaica, Hispaniola, and eight other islands. One specimen from Georgetown is deposited in the United States National Museum.

2. CARPELIMUS CHAPINI Blackwelder

Carpelimus chapini Blackwelder, U. S. Nat. Mus. Bull. 182, p. 81, 1943.

Grand Cayman: South Sound (3).

Taken in light-trap in June 1938. This species was described from a small series from Jamaica. One specimen is deposited in the U. S. National Museum.

3. CARPELIMUS DISSONUS (Bierig)

Trogophloeus dissonus Bierig, Mem. Soc. Cubana Hist. Nat., vol. 9, p. 11, 1935.
Carpelimus dissonus (Bierig), Blackwelder, U. S. Nat. Mus. Bull. 182, p. 83, 1943.

Little Cayman: South Town (133).

Taken in a light-trap on May 29, 1938. This species was previously known only from Cuba, from the collections of Alexander Bierig. Fifteen examples are deposited in the United States National Museum.

4. CARPELIMUS SORDIDUS (Cameron)

Trogophloeus (*Taenosoma*) *sordidus* Cameron, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 394, 1923.
Carpelimus sordidus (Cameron), Blackwelder, U. S. Nat. Mus. Bull. 182, p. 84, 1943.

Grand Cayman: (no other locality).

Not taken since the original discovery by Dr. M. Cameron. I have examined the type briefly but was unable to identify any of my specimens with it. (The statement in my monograph that no examples had been seen was an error due to an oversight.)

5. CARPELIMUS sp.

Little Cayman: South Town (1).

One example that seems to differ from the four listed above is not identifiable at this time because of its condition. It appears to have an unusual type of sculpturing on the pronotum.

6. BLEDIUS ESPOSUS Blackwelder

Bledius esposus BLACKWELDER, U. S. Nat. Mus. Bull. 182, p. 114, 1943.

Little Cayman: South Town (4).

Taken in the light-traps in May and June 1938. This species was previously known only from the holotype from Antigua. One specimen is deposited in the U. S. National Museum.

7. BLEDIUS MANDIBULARIS Erichson

Little Cayman: South Town (127).

Taken in the light-traps in May and June 1938. This is the most unusual record in the entire collection, since it is a species previously unknown in the West Indies or in the Tropics. It is widespread but not common in the United States, ranging from Connecticut to Florida and west to Texas and Utah.

Synonymy.—The following synonymy is recognized:

Bledius mandibularis ERICHSON, 1840, p. 765.—LECONTE, 1877, pp. 218, 219.—SCHWARZ, 1878, p. 442.—HAMILTON, 1884, p. 187.—CASEY, 1889, p. 42.—WENZEL, 1897, p. 218.—BERNHAUER and SCHUBERT, 1911, p. 133 (as synonym of *pallipennis* Say).—LENG, 1920, p. 97 (as synonym of *pallipennis* Say).—BRITTON, 1920, p. 226 (as synonym of *pallipennis* Say). (Not MacLeay, 1873.)

Bledius brevidens LECONTE, 1877, pp. 218, 219, 220.—HENSHAW, 1881, p. 221.—DUVIVIER, 1883, p. 186.—CASEY, 1889, p. 42.—SNOW, 1906, p. 143.—BERNHAUER and SCHUBERT, 1911, p. 127.—LENG, 1920, p. 97.—LÖDING, 1945, p. 35.

Description.—Rufotestaceous throughout, the head generally somewhat picescent. *Head* very convex above but somewhat flattened between the eyes, with irregular elevations along the midline, which is more or less impressed; supraantennal ridges large and prominent; antennal segments 9 and 10 transverse; labrum just twice as wide as long, the anterior margin straight; third segment of maxillary palpus large, not flattened, fourth small, conical; submental suture nearly straight, submentum strongly and deeply impressed at base, the pit imperfectly divided into two by a broad elevation of its floor, the pit

nearly as wide as the submentum; surface above and below with dense (tuberculous) sculpture and scattered umbilicate punctures. *Pronotum* one-fourth wider than long, semioctagonal; midline finely but very distinctly impressed; lateral margin marked by a suture or ridge only near the front angles; with large umbilicate punctures generally separated by one to two times their diameter; with strong and dense scaly ground sculpture. *Elytra* feebly dehiscent, the apex broadly rounded except internally; with punctures as on pronotum but a little denser and much less definite, without definite ground sculpture but surface very uneven. Length, 6 to 9 mm.

Type locality.—"America septentrionali (?)." Of *brevidens*, "New York."

Types.—Either in the Hope Museum, Oxford, or the Zoologische Museum, Berlin. Of *brevidens*, in the Museum of Comparative Zoology, Cambridge, Mass. (Typical examples may also be in the Horn collection at the Academy of Natural Sciences of Philadelphia.)

Records.—The following are the records known to me:

Cayman Islands: Little Cayman (Lewis and Thompson, in Jamaica Institute, Oxford University, British Museum, and U. S. National Museum).

North America: (Erichson, 1840), New York, Atlantic coast of Middle States (LeConte, 1877), Florida (Schwarz, 1878), New Jersey (Hamilton, 1884), Texas (Snow, 1906, as *brevidens*), Alabama (Löding, 1945), Connecticut, New York, New Jersey, Maryland, Georgia, Florida, Illinois, Texas, Utah (U. S. National Museum).

Specimens examined.—I have seen 127 specimens from the Cayman Islands, as well as about 50 from the United States.

Remarks.—This is a very distinct species in the West Indian fauna, distinguishable at a glance by its size and color. In the United States it has two or three close relatives, from which it can be separated by the structure of the submentum. *B. lecontei* Sharp of Mexico is also very similar, but it differs in having a much narrower (almost circular) submental fossa and more deeply impressed gular sutures.

The following account of the collection of these beetles has been sent to me by Mr. Lewis: "On May 29, 1938, Thompson and I set up light-traps in three areas, one of these being on the southern side of a dead mangrove swamp north of South Town, the only settlement on the island. The traps were of a new design, using an acetylene lamp surrounded by four funnels, each of which was supplied with a killing jar. The traps were all started at about 7:30 each night.

"On the first night, after two hours of operation, the trap at the edge of the swamp had been put out of action by the tremendous volume of insects it had received. Most of them were this staphylinid. A quantitative method of counting the specimens was used, and it was found that at least 25,000 specimens of this species were taken in that 2-hour period. The trap was then cleared, cleaned, and reset.

During the rest of the night the insect catch was large, but only about 1,500 specimens of this staphylinid came in.

"On the following evening, May 30, the quantitative method of counting indicated that at least 25,000 specimens of this species were taken between 7:30 and 9:30 P. M. During the rest of the night only about 2,500 specimens were taken in the trap. After a similar experience on May 31, the trap was removed from the site, as most of the other insects taken were in such bad condition as a result of the hordes of *Bledius* that they were quite useless.

"The other traps were set less than a quarter of a mile away but in different habitats; one was in a pasture, and the other was near the top of a beach. In neither of these was there taken any specimen of this *Bledius* at any time."

Subfamily Osoriinae

8. OSORIUS LEWISI Blackwelder

Osorius lewisi Blackwelder, U. S. Nat. Mus. Bull. 182, p. 197, 1943.

Grand Cayman: Georgetown (1).

Taken in a light-trap on April 25, 1938. This species is known only from the holotype, which is deposited in the British Museum.

Subfamily Paederinae

9. SUNIUS DEBILICORNIS (Wollaston)

Lithocharis debilicornis Wollaston, Catalogue of the coleopterous insects of Madeira . . ., p. 194, 1857.

Sunius debilicornis (Wollaston), Blackwelder, U. S. Nat. Mus. Bull. 182, p. 267, 1943.

Grand Cayman: Georgetown (1).

Taken in a light-trap on April 23, 1938. The species was known previously from Cuba, Jamaica, the Lesser Antilles, the Americas, Europe, Africa, the Oriental region, Australia, and New Caledonia. It is always taken in small numbers.

10. SCOPAEUS PYGMAEUS Erichson

Scopaeus pygmaeus Erichson, Genera et species staphylinorum . . ., p. 608, 1840.—Blackwelder, U. S. Nat. Mus. Bull. 182, p. 287, 1943.

Grand Cayman: Georgetown (1), South Sound (1).
Little Cayman: South Town (1).

Taken in light-traps in April, May, and June 1938. The species was previously known from Jamaica and seven of the other islands. One example (Georgetown) is deposited in the United States National Museum.

11. LOBRATHIUM ODIUM Blackwelder

Lobrathium odium Blackwelder, U. S. Nat. Mus. Bull. 182, p. 318, 1943.

Grand Cayman: South Sound (22), Georgetown (1).

Taken in light-traps in April and June 1938. The species was described from Cuba and is perhaps the same as an older species occurring in Cuba, Hispaniola, and St. Thomas. Six specimens are deposited in the United States National Museum.

12. HOMOEOTARSUS ALBIPES (Erichson)

Cryptobium albipes ERICHSON, Genera et species staphylinorum . . ., p. 566, 1840.

Homoeotarsus albipes (Erichson), BLACKWELDER, U. S. Nat. Mus. Bull. 182, p. 328, 1943.

Grand Cayman: South Sound (9).

Taken in light-trap in June 1938. The species was previously known from Cuba, Jamaica, four of the other islands, and South and Central America. Three specimens are deposited in the United States National Museum.

13. STAMNODERUS LABEO (Erichson)

Sunius labeo ERICHSON, Genera et species staphylinorum . . ., p. 648, 1840.

Stamnoderus labeo (Erichson), BLACKWELDER, U. S. Nat. Mus. Bull. 182, p. 352, 1943.

Grand Cayman: South Sound (1).

Taken in light-trap on June 19, 1938. The species was known from Cuba, the Isle of Pines, Jamaica, and five other islands.

14. PINOPHILUS FLAVIPES Erichson

Pinophilus flavipes ERICHSON, Genera et species staphylinorum . . ., p. 383, 1840.—BLACKWELDER, U. S. Nat. Mus. Bull. 182, p. 383, 1943.

Little Cayman: South Town (5).
[Grand Cayman: by error, see below.]

Taken in light-traps in May and June 1938. The record of Grand Cayman in my monograph appears to be a lapsus, since the specimens are all from Little Cayman. The species is known also from the Bahamas, Cuba, Hispaniola, and Puerto Rico. Two specimens are deposited in the United States National Museum.

15. PINOPHILUS SCHWARZI Blackwelder

Pinophilus schwarzi BLACKWELDER, U. S. Nat. Mus. Bull. 182, p. 386, 1943.

Grand Cayman: South Sound (16).

Taken in light-traps in June 1938. The species was described from Cuba and the Caymans.

16. PALAMINUS sp.

Grand Cayman: Hut Road on north side (1).

Taken in light-trap on July 15, 1938. This species occurs also on Cuba, but the material available will not enable a specific determination to be made.

Subfamily Staphylininae

17. PHILONTHUS VENTRALIS (Gravenhorst)

Staphylinus ventralis Gravenhorst, Coleoptera Microptera Brunsvicensia . . ., p. 174, 1802.
Philonthus ventralis (Gravenhorst), Blackwelder, U. S. Nat. Mus. Bull. 182, p. 404, 1943.

Grand Cayman: Georgetown (1).

Taken in light-trap on April 22, 1938. The species is known from Cuba, Jamaica, and most of the other islands, as well as from North and South America, Europe, Asia, and northern Africa.

18. PHILONTHUS HAVANIENSIS (Laporte)

Staphylinus havaniensis Laporte, Études entomologiques . . ., pt. 1, p. 116, 1834.
Philonthus havaniensis (Laporte), Blackwelder, U. S. Nat. Mus. Bull. 182, p. 418, 1943.

Grand Cayman: South Sound (10), Georgetown (2).

Taken in light-traps in April and June 1938. The species is known from Cuba, Jamaica, and five of the other islands. Three of these examples are deposited in the United States National Museum.

Subfamily Aleocharinae

19. ATHETA GUATEMALAE Bernhauer and Scheerpeltz

Atheta guatemalae Bernhauer and Scheerpeltz, Coleopterorum catalogus, pars. 82, p. 667, 1926.—Blackwelder, U. S. Nat. Mus. Bull. 182, p. 553, 1943.

Grand Cayman: (no other locality).

This species has not been reported since its description by Dr. M. Cameron (under the name *pumila*).

20. ZYRAS sp.

Grand Cayman: Georgetown (2).

Taken in light-trap on May 12, 1938. I am unable to identify this species, since most of the known species are not available for comparison.

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MAMMALS OF NORTHERN COLOMBIA

PRELIMINARY REPORT No. 2: SPINY RATS (ECHIMYIDAE), WITH SUPPLEMENTAL NOTES ON RELATED FORMS

By Philip Hershkovitz

The echimyid rodents collected by the author in northern Colombia during his tenure of the Walter Rathbone Bacon Traveling Scholarship [1] include 5 specimens of *Echimys semivillosus* (I. Geoffroy) and 150 specimens representing *Proechimys guyannensis* E. Geoffroy [2] and *P. canicollis* (Allen). The only other echimyid rodent previously recorded from the region under study is *Diplomys rufodorsalis* Allen from Onaca, near Santa Marta. Possibly a form of *Hoplomys* occurs somewhere in the lowlands of northern Colombia, and a representative of *Thrinacodus*, perhaps *T. edax*, in the highest levels of that part of the Cordillera Oriental visited by the author.

In the following account some of the taxonomic problems presented by the species collected are discussed, involving a more extensive treatment of the genus *Proechimys* than is implied by the geographical limitations of the title of this report. For this the author has drawn information from his notes on the type specimens of *Proechimys* in the British Museum and in the various American institutions, as well as from considerable supplementary material. Thanks are expressed

[1] The northern Colombian and western Venezuelan localities mentioned in the text are shown on the map accompanying the first preliminary report on the mammals of northern Colombia, Proc. U. S. Nat. Mus., vol. 97, pp. 1–46, fig. 1, 1947. In this report the symbol combinations for contrasting color patterns of squirrels given on page 9, subheading 4c, next to last line, as 4ab and 4ac should read 4ac and 4bc, respectively. Corresponding changes in the text are as follows: Page 17, line 3 for 4a read 4b, line 22 for 4ac read 4bc, page 24, line 23 for 4ab and 4ac read 4ac and 4bc, respectively, line 38 for 4ab read 4ac, line 40 for 4ac read 4bc. The symbols in table 1, page 34, are correct. On pages 9 and 36 read *candelensis* for *candalensis;* page 36 line 6, read *versicolor* for *inconstans;* on pages 6, 7, 10, 21, 22, 29, 32, 33, and 36 read *chrysuros* for *chrysurus.*

[2] Antedates *cayennensis* Desmarest.

to Dr. W. H. Burt, of the University of Michigan Museum of Zoology, for the loan of material and permission to describe one of the specimens as a new species. Grateful acknowledgment is made to Karl P. Schmidt, chief curator of zoology of the Chicago Natural History Museum, and to Dr. João Moojen, curator of mammals of the Museu Nacional, Rio de Janeiro, Brazil, for the loan of specimens.

All capitalized color terms are from Ridgway ("Color Standards and Color Nomenclature," Washington, 1912).

ECHIMYS SEMIVILLOSUS SEMIVILLOSUS (I. Geoffroy)

Nelomys semivillosus I. Geoffroy, Ann. Sci. Nat., ser. 2, vol. 10, p. 125, 1838 (abstract of description); Mag. Zool., Paris, 1840, pp. 42, 50, pls. 23, 28, figs. 7–9.

Type locality.—Cartagena, Department of Bolívar, Colombia.

Distribution.—Lowlands of northern Colombia. As yet known only from the lower Río Magdalena drainage system.

Coloration.—Hairs of upper surface of body Ochraceous-Buff to Ochraceous-Orange medially, becoming paler laterally; sides grayish to Light Buff or Warm Buff; dorsum and sides with a mixture of wholly black or brown spines, spines punctulated with white to buffy, the punctulated spines most conspicuous on posterior half of back and base of tail; crown grizzled, nape and interscapular region blacker; white to buffy postauricular patches present; rostrum, sides of face below dark orbital rings whitish to buffy; outer sides of fore and hind legs like sides; fore and hind feet above gray with dark patches, toes gray. Underside of head, body, and limbs white lightly washed with buff. Base of tail like back, remainder light brown thinly covered with short hairs, the hairs brown proximally, becoming paler to gray terminally.

Measurements (in millimeters, of three adults).—Head and body, 207, 227, 220; tail, 218, 222, ——; hind foot, 38, 39, 37; ear, 19, 18, 17; condylobasal length, ——, 46.6, 48.9; zygomatic breadth, ——, 24.2, 25,6; length of nasals, 17.7, 16.2, 17.5; least interorbital width, 14.2, 16.2, 17.5; braincase, width, ——, 19.7, 19.7; bullae, ——, 7.7 by 12.6, 8.1 by 12.9; alveolar length of molar row, 12.0, 12.1, 11.6.

Remarks.—The foregoing description is based on three adults taken in the Río Cesar and Río Guaimaral region. Two immature individuals of the same series have the following external measurements: Head and body, 145, 153; tail, 154, 173; hind foot, 33, 34; ear, 16, 16. Although the tail is longer than the combined head and body length in the young, it may become proportionately shorter as growth of the individual continues. In adults, tail length is subequal to, or shorter than, combined head and body length. Spines are completely lacking in the two young individuals; otherwise their pelage and coloration are as in adults.

The present series is quite typical and represents the first record of true *semivillosus* since the types were sent from Cartagena by the former French consul, M. Pavageau, more than a hundred years ago.

A NOTE ON ECHIMYS ARMATUS (I. GEOFFROY)

A specimen of *Echimys armatus*, collected on April 20, 1945, in Caparrapí, a municipality in the Magdalena Valley, Cundinamarca, and received from the Rockefeller Foundation, is of special interest. This individual, an adult male, not only confirms the occurrence of the species west of the eastern slopes of the Andes but also indicates that the range of *E. armatus* overlaps that of *E. semivillosus* in Venezuela and Colombia. The correctness of the type locality of *E. armatus occasius*, Gualea, on the western slope of the Ecuadorian Andes, has been questioned (Tate, 1935, p. 428). The present specimen shows, however, that the distributional pattern of the species conforms, at least in part, to that of many other Brazilian or Amazonian species of mammals that have rounded the northern flanks of the Andes and pushed into the coastal lowlands and mountain valleys of western Colombia and Ecuador. The genus *Echimys* has not been recorded from Central America.

The species *armatus* is readily distinguished from *E. semivillosus* by redder coloration and black spines not punctulated with whitish. Ellerman (1940, p. 112) included *longirostris*, *obscura*, *punctatus*, *flavidus*, and *carrikeri* in the *E. armatus* group; *guianae* and *castaneus* were regarded as strictly synonymous with *armatus*, while *occasius* was listed as a subspecies of it. Tate (1939, p. 180) added *longirostris* to the synonymy of *armatus* but listed *castaneus* (with *flavidus* a synonym!) as a valid subspecies. The type specimens of the above-named forms, which have been examined by the writer, may be classified as follows:

Echimys armatus armatus (I. Geoffroy), Cayenne
(*guianae* Thomas and *longirostris* Anthony, synonyms)
Echimys armatus castaneus Allen and Chapman, Trinidad
Echimys armatus occasius Thomas, Gualea, western Ecuador (type an immature)
Echimys semivillosus semivillosus (I. Geoffroy), Cartagena, Colombia
Echimys semivillosus punctatus Thomas, Caicara, Venezuela
Echimys semivillosus flavidus Hollister, Margarita Island
(*carrikeri* Allen, a synonym)

SPECIES OF THE SUBGENUS PROECHIMYS

The highly variable assortment of individuals composing the species of the genus *Proechimys* has rendered their classification difficult. This difficulty has been further aggravated by the host of described forms based mainly on individually variable characters or on characters that have only a limited and local constancy. The classification

of the subgenus *Proechimys* presented by Ellerman (1940, pp. 115–122) in his monumental treatise of the rodents of the world shows a sharp reduction in the number of species. In typical *Proechimys*, Ellerman listed six species in the "*cayennensis* [=*guyannensis*] group" and one, *P. iheringi*, in the "*iheringi* group." The subgenus *Trinomys* consisted of *albispinus* and *setosus*. Reasons for making the above divisions of the genus were given. The discussion here is limited mainly to the species of the *guyannensis* group and to the species of the subgenus *Proechimys* listed by Ellerman as not seen and not allocated to group.

The six species of Ellerman's "*cayennensis* group" are *guyannensis*, *vacillator*, *hendeei*, *rattinus*, *canicollis*, and *dimidiatus*. The species *guyannensis*, as constituted by Ellerman, will doubtlessly prove to be composite. He admitted the possibility of error in listing under *guyannensis* the *Proechimys* described from Central America, in this following the tendency among authors to assign these forms to a single species. However, there are at least two kinds of spiny rats common to Central America and northwestern South America. To determine what names are applicable to them would require a more careful examination of the type specimens in the British Museum than the present author has been able to make. It remains a moot point which ones, if any, of the described Central American forms are indeed referable to *P. guyannensis*. Under the circumstances it is best to accept provisionally Ellerman's classification and to continue treating *P. guyannensis* as a composite species. Possibilities for its ultimate subdivision into natural entities will be pointed out in following discussions. *P. canicollis* differs in important characters and appears to be annectant between *P. guyannensis* and the subgenus *Trinomys*. *P. vacillator* may prove to be a race of *canicollis*. *P. hendeei* is very nearly related to *guyannensis* but distinct specifically. The type of *P. rattinus*, a skull only, is that of a race of *guyannensis*. *P. dimidiatus* is, according to the writer's notes, an immature individual and presents no special peculiarities other than the very deep incision of the posterior palatal notch, on a plane with M^2. It is certainly a member of the group, but it cannot now be determined whether it is a local form of the common species or whether it replaces the name of a more recently described species, possibly *hendeei*.

Of the 12 species listed by Ellerman as not seen and not allocated to group, the present author has been able to examine *ochraceus*, *poliopus*, *oconnelli*, *steerei*, *boimensis*, and *kermiti*. These are all referable to *guyannensis* and are discussed under that specific heading. *P. leucomystax* Miranda Ribeiro, as described and figured, is also a representative of the common species. According to Thomas (1921, p. 141), *myosurus*, *leptosoma*, *cinnamomeus*, *elegans*, and *fuliginosa* are all synonyms of *setosus*, a *Trinomys*. This opinion may

be questioned, at least with respect to *elegans* Lund, but unless the types, if still in existence, show anything to the contrary, these conclusions must be accepted. On the basis of the original description, *Echimys macrourus* Jentink cannot be identified with *Proechimys*. The type is a skin only from Surinam with the following measurements: Head and body, 221; tail, 320; ear, 25; hind foot, 41 mm. The tail is too long, both actually and in proportion to combined head and body length, for *Proechimys* as known; the hind foot is too small for any *Proechimys* of comparable head and body length. These measurements may have been taken from the dried skin; hence they are not really comparable. Tate (1939, p. 180) admitted the possibility of *macrourus* being a form of *Echimys armatus*. This opinion is probably correct.

Leaving to one side the nomenclatorial problems that may arise once the exact status of each of such forms as *dimidiatus* and *vacillator* is entirely clarified, we find the subgenus *Proechimys* to consist of four recognizably distinct species. These are *iheringi*, *canicollis*, *hendeei*, and the composite *P. guyannensis*. To these are added two more species, one described as new, which form a group distinguishable by the enamel pattern of the molariform teeth.

CHARACTERS OF THE SPECIES

It has been found that external characters are not wholly reliable in distinguishing the species of typical *Proechimys* from one another. Differences in coloration are evident when comparing representatives of two or more species from the same or nearby localities. In other localities the differences between the same species may be reversed! The character of the spines is important in distinguishing superspecific categories of the Echimyinae, but in *Proechimys* (*sensu stricto*) it is at best only of some slight relative diagnostic value. Size differences between the species cannot easily be demonstrated. There may be some evidence of gradients in size within any one species, as well as some proportional differences, particularly in the length of the tail to the combined head and body length. Taken as a whole, however, no significant differences in size exist between any of the species. Most cranial characters, which are absolute for distinguishing two or more species from each other when these species are from the same or nearby localities, break down or reverse themselves when applied to representatives of these same species from widely separated localities. Of all the characters studied and of those described as diagnostic, only three or four seem to be of some value. In *canicollis* the walls of the mesopterygoid fossa are considerably fenestrated, more so than in the other species where the tendency is for no fenestration at all. In *hendeei*, *dimidiatus*, and *iheringi* the palatal notch extends anteriorly beyond the plane of M^3; in the other species it does not

extend beyond M^3. It is possible that proportional differences in cranial parts exist between the species, but this cannot be demonstrated on the basis of present material and would be most difficult to show with any amount of specimens. The individual and local variation among these rats is so great that it is practically impossible to select a sufficient number of truly comparable skulls for determining proportional differences.

The enamel pattern of the molariform teeth offers a reliable means for classifying the species of *Proechimys*, but even here the variations frequently introduce difficulties into any attempt to interpret correctly the nature of the structures concerned. Nevertheless, the species of typical *Proechimys*, and annectant forms, may be classified primarily according to the following formulae, which show the number of outer enamel folds in each of the upper molariform teeth and the inner folds of the lower teeth:

A. $\frac{2-2-2-2}{2-2-2-2}$ to $\frac{3-2-2-2}{3-2-2-2}$

1. Spines soft ---------- **P. canicollis**
2. Spines stiff ---------- **Trinomys** (subg.)

B. $\frac{3-3-3-2}{3-2-2-2}$ to $\frac{3-3-4-4}{4-3-3-3}$

1. Palatal notch extending forward beyond anterior plane of M^3
   a. Zygoma broad, outer surface of jugal nearly plane, the ridge almost obsolete ---------- **P. iheringi**
   b. Zygoma normal, outer surface of jugal crossed by a well-developed ridge ---------- **P. hendeei** (and **dimidiatus**, type)
2. Palatal notch not extending forward as far as posterior plane of M^2 ---------- **P. guyannensis** (composite)

C. $\frac{4-4-4-4}{4-3-3-3}$ ---------- **Quadruplicatus** group (*P. ignotus*, *P. quadruplicatus*, n. sp.)

D. $\frac{4-4-4-4}{4-4-4-4}$ ---------- **Hoplomys** (genus)

Four folds, as in the *Quadruplicatus* group, appear to be the maximum if not the original number in the upper molariform teeth. This has been pointed out by Winge (1888, p. 86) in his description of the teeth of *P. guyannensis* from Lagôa Santa. In this species a fourth fold may be evident on the crown of the last two upper molars. It usually appears as a complication or branch of the third fold. With wear, the point of union between the two folds may be erased, with the result that the fourth fold becomes an enamel island. On the other hand, in some populations of *guyannensis* there is a tendency for the loss of even the third fold of the last upper molar and in each of the lower molars. In *canicollis* this is carried to an extreme. Here the third fold is found in the lower premolar only in certain populations. Throughout the genus the general trend is toward a greater simplifi-

cation of the enamel pattern of the molariform teeth. Given the "normal" number of folds for each species, as outlined in the key, and beyond, the greater tendency is for the elimination of one of the "normal" number of folds than for the reappearance of an additional fold.

A satisfactory determination can be made of the "normal" pattern and the significant deviations therefrom only in a large series that includes individuals with unworn and fully formed but unerupted teeth. With wear, an enamel fold becomes isolated from the margin of the crown and appears as an enamel island. Because of inequalities in the depth along its base the fold may break up into two islands. Furthermore, a sinuous curve in the original fold may result in one of the subsequently formed islands assuming a position such as to appear as a distinct enamel fold. Frequently any two adjacent folds may be united in the form of a single fold with two branches. With wear, one of the branches becomes isolated from the other, thus restoring, in appearance, the "normal" pattern of the tooth. As a consequence of the order of dental succession, the premolar and first molar are considerably more worn, their patterns more modified and divergent from the "normal" pattern than the remaining molars. Though many instances of mechanically induced types of variation may be cited, the foregoing formulae are sufficiently broad to facilitate the specific identity of most of the spiny rats of the genus.

PROECHIMYS CANICOLLIS (Allen)

Echimys canicollis ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 200, 1899.

Type locality.—Bonda, near Santa Marta, northwestern base of the Sierra Nevada de Santa Marta, Department of Magdalena, Colombia.

Distribution.—Northern Colombia. Known from the Río Cesar Valley and the northwestern and eastern bases of the Sierra Nevada de Santa Marta, Department of Magdalena, and from the Ciénaga de Guájaro, about midway between Barranquilla and Cartagena, Department of Atlántico.

Characters.—A pale spiny rat, upperparts buffy to ochraceous mixed with black, no well-defined median dorsal band present; spines soft and mostly hidden by the soft annulated hairs. Underparts with gray lateral lines, which may extend mesially over the whole ventral surface or, more commonly, over neck and throat only. Upper surface of fore and hind feet well covered with whitish hairs. Tail thickly covered with comparatively long hairs. Walls of mesopterygoid fossa extremely fenestrated. Molariform teeth as described.

Comparisons.—Distinguished externally from *P. guyannensis mincae*, the only other representative of the genus found in the same general region, by hairier tail, softer spines, and slightly shorter ear and hind

foot; cranially, by extremely large fenestrations of the mesopterygoid fossa, larger, more inflated bullae, elongated, rather than broad, hamular processes, broad jugal with a distinct spinous process, narrower basioccipital, and by the enamel pattern of the molariform teeth.

Remarks.—Only the typical form of the species is known. Judged by the original description and remarks by Ellerman (1940, p. 117), *P. vacillator* is most probably either a race of *canicollis* or a very nearly related species.

P. canicollis was based on specimens from Bonda, Santa Marta, Mamatoco, and other nearby localities ranging in altitude, according to Allen (*op. cit.*), from sea level to 500 feet. Specimens were taken by the writer in the heavy deciduous forest of the Río Cesar and the Río Guaimaral, a channel of the Cesar. They were taken also in a nearby savanna (Palmarito) and from an intermediate site (Aguas Verdes) between the savanna and the forest. These rats were most abundant under decaying logs in the forest, and in the thick, spiny brush bordering the grasslands. Additional specimens were taken in the semiarid grass and scrub country about the town of Villanueva and in the similarly deforested region of the Ciénaga de Guájaro. All series agree closely with topotypes of *canicollis*. No other species of *Proechimys* was found in these localities.

According to Herbert H. Smith (*in* Allen, 1904, p. 440), who collected the type series of *P. guyannensis mincae* and of *P. canicollis*, "the latter is the common rat below 1,000 feet; the former takes its place in open lands, dry forests and thickets from about 1,000 to about 2,500 feet; but it does not extend far into the true mountain forest. Some *mincae* are found nearly to sea level, and *canicollis* occurs, rarely to 2,000 feet." All present specimens of *canicollis* from the department of Magdalena are from the lowland areas surrounding the Sierra Nevada de Santa Marta. In the mountain mass itself, only specimens of *mincae* were taken. Apparently the two species have different habitat preferences where Smith collected.

Specimens examined.—A total of 111, all in the collection of the United States National Museum: Bonda, 7; Santa Marta, 1; Ciénaga de Guájaro, Atlántico, 15 meters altitude, 13; Río Guaimaral, Río Cesar, 140 meters, 13; Aguas Verdes, near Río Guaimaral, 26; Palmarito, near Aguas Blancas and Río Guaimaral, 3; El Orinoco, Río Cesar, 158 meters, 15; Villanueva, 274 meters, 33.

PROECHIMYS GUYANNENSIS (E. Geoffroy)

Mus guyannensis E. GEOFFROY, Catalogue des mammifères du Muséum National d'Histoire Naturelle, Paris, p. 194, 1803.

Echimys cayennensis DESMAREST, Nouv.Dict. Hist. Nat., ed. 2, vol. 10, p. 58, 1817

Type locality.—Cayenne, French Guiana.

Distribution (of the species).—Tropical parts of South and Central America from Nicaragua to southern Brazil and Paraguay.

Characters (of the species).—Upperparts from buffy, almost grayish, to tawny mixed with black, the median dorsal area when conspicuously darker, not sharply defined as a black band; spines stiffer, less tendent, and generally more prominent in middorsal region than in *canicollis*. Underparts white or with a drab to pale brown lateral line, which may extend midventrally as in *canicollis*. Upper surface of fore and hind feet with whitish to dark brown hairs. Tail sparsely haired. Point of palatal notch on a level with or behind plane across middle of last molars. Enamel pattern of molariform teeth as described.

Comparisons.—Cranial characters other than those cited are not diagnostic except in comparisons with species occurring in the same or nearby localities. Comparisons have already been made between *P. canicollis* and the form of *guyannensis* found in northern Colombia. Further comparisons are made in the descriptions of the other species.

Remarks.—If we accept provisionally as subspecies of *guyannensis* all the forms so treated by Ellerman as well as others listed below, the races of the composite species are divisible into two geographical groups on the basis of the dental patterns. The first group, which includes typical *guyannensis*, occupies northern South America in the areas east of the Río Magdalena and north of the Orinoco. The majority of the spiny rats here show the following formula for the enamel pattern of the molariform teeth: $\frac{3-3-3-(2-3)}{3-2-2-2}$.

Of the forms not seen and not assigned to group by Ellerman, the following belong here: *poliopus*, *ochraceus*, and *oconnelli*. The occurrence of the geographically restricted *P. canicollis* within the range of this group of *guyannensis* indicates a probably recent origin from it. Some eastern Brazilian spiny rats, including *P. g. arescens* Osgood, from Maranhão, conform to the characters of this group but are widely separated geographically.

In Central America, western Colombia west of the Magdalena, western Ecuador, and in the Amazonian region the populations of *P. guyannensis* show, generally, the less simplified formulae

$$\frac{3-3-3-3}{3-3-3-3} \text{ to } \frac{3-3-4-4}{4-3-3-3}.^{3}$$

The latter formula approaches that of the *Quadruplicatus* group, but present material does not indicate that it grades into it. The holotype and an adult topotype of *steerei* are characterized by that dental pattern. A series of topotypes of *calidior* in the U. S. National Museum also show the pattern with four folds in the last two upper molars and the lower premolar. The type skull of *semispinosus* has four folds in only the last upper molar, as well as in the lower premolar. The very clear description given by Winge (1888, p. 86)

[3] All formulae given and all references made to enamel folds are based on the number of outer folds in the upper and the number of inner folds in the lower molariform teeth.

shows that his *guyannensis* specimens have the formula of the dental pattern $\frac{3-3-3-(3-4)}{4-3-3-3}$. Allen's *boimensis* and *kermïti* belong here too, according to the pattern of their molariform teeth. *P. leucomystax* is also a member of this group, though the published figures of the upper and lower jaws of the type are not sufficiently clear to permit an exact determination of the dental pattern. The type specimen of *elassops* Osgood, described from Santo Domingo, Río Inambari, Peru, as a subspecies of *P. hendeei* shows the cranial and dental characters of this group of *P. guyannensis*. Throughout this geographical group there is a strong tendency for retention, to a greater or lesser degree, of the fourth fold in the third and often in the second upper molars. In all such cases the lower premolar has four folds. This pattern is very common among the Central American *Proechimys*, and it is questionable whether the name *guyannensis* should apply to them. Other Central American and Amazonian spiny rats show the complete quadruplicate pattern in the upper molariform teeth and cannot be included in this group. Nevertheless, these may have been regarded, in some cases, as "topotypes" of described forms of the group of *guyannensis* in question. As is shown, two and even three species of spiny rats may be found in the same habitat.

Pending a revision of the genus, it is recommended that the above-named forms be treated as subspecies of *P. guyannensis*.

The forms of *guyannensis* (composite) collected by the author in northern Colombia represent the two principal dental types that follow geographical lines.

PROECHIMYS GUYANNENSIS MINCAE (Allen)

Echimys mincae ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 12, p. 198, 1899.

Type locality.—Minca, near Santa Marta, Magdalena, Colombia.

Distribution.—Base and lower levels of the Sierra Nevada de Santa Marta, from near sea level to approximately 500 meters above, Department of Magdalena, Colombia.

Characters.—Palest of the Colombian and Central American races of *guyannensis;* color as in *guairae* and *ochraceus* of the Venezuelan coast, feet whitish, underparts white with or without a gray gular band or patch. Formula of enamel pattern of molariform teeth as in northeastern South American *guyannensis*, $\frac{3-3-3-3}{3-2-2-2}$.

Remarks.—Allen recorded 87 specimens of *mincae* from Minca and Bonda. At the same time he described *P. canicollis* from specimens taken at Bonda, Santa Marta, Mamatoco, and other nearby points, all situated on the northwestern foot and base of the Sierra Nevada. Apparently, in that region, the two species occur in the same general area, if not in the same habitat. The present author took one adult

male in the deciduous forest of the Colonia Agrícola de Caracolicito, on the southern slope of the Sierra Nevada, and five males, only one fully adult, on the high wooded banks of a stream at El Salado, on the eastern slope of the same mountain mass. No specimens of *canicollis* were found at these localities.

P. g. mincae is most nearly related to the northern Venezuelan and Guianan races of the species. It differs widely in external characters and, especially, in the enamel pattern of the molariform teeth, from the forms of *guyannensis* in Central America and western Colombia. From these latter it is completely isolated geographically by the Río Magdalena. It is probable that it has, or had, before wide deforestation took place, a continuous range to the north and east, intergrading with the pale races of northern Venezuela. At present, so far as known, only *P. canicollis* occupies the Río Cesar Valley to the east. In the Sierra de Perijá the distinctly darker *P. guyannensis poliopus* occurs.

Specimens examined.—Fourteen, all in the collection of the United States National Museum: Minca, 4; Manzanares, between Minca and Santa Marta, 2; Bonda, near Santa Marta, 2; Colonia Agrícola de Caracolicito, Río Ariguaní, 335 meters altitude, 1; El Salado, between Pueblo Bello (Pueblo Viejo Sur) and Valencia, 430 meters, 5.

PROECHIMYS GUYANNENSIS POLIOPUS Osgood

Echimys chrysaeolus Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 1, p. 245, 1898 (part; specimen from San Cristóbal, Táchira, Venezuela, only).

Proechimys poliopus Osgood, Publ. Field Mus. Nat. Hist., zool. ser., vol. 10, p. 141, 1914.

Type locality.—San Juan de Colón, altitude 797 meters, on the northern slope of the Sierra de Mérida near the angle it forms with the Sierra de Perijá, State of Táchira, Venezuela.

Distribution.—In the Sierra de Mérida and the Sierra de Perijá, the Ríos Zulia and Catatumbo drainage basins, northeastern Colombia and western Venezuela.

Characters.—Darker throughout than *mincae, guairae,* and *ochraceus;* upperparts Ochraceous-Tawny mixed with black, underparts from nearly uniformly white to nearly wholly Drab; fore and hind feet Drab with or without white markings. Dental characters as formulated for *mincae.*

Remarks.—The original description was based on a subadult, sex unknown. The present series (10 males, 7 females) from Tarra, upper Río Catatumbo, Norte de Santander, Colombia, agrees with *poliopus* in the important characters, though it may prove to average darker than comparable adult specimens from the type locality. However, the series is near enough geographically to be confidently assigned to *poliopus.* The subspecies as now constituted more nearly

resembles the eastern Andean races of Colombia than the coastal forms of Venezuela.

Specimens examined.—Nineteen. The type, collection of the Chicago Natural History Museum; Río Tarra, 18, collection of the United States National Museum.

PROECHIMYS GUYANNENSIS CHRYSAEOLUS (Thomas)

Echimys chrysaeolus THOMAS, Ann. Mag. Nat. Hist., ser. 7, vol. 1, p. 244, 1898.

Type locality.—Muzo, a town in the Minero Valley of the Río Carare, western slope of the Cordillera Oriental, Department of Boyacá, Colombia.

Distribution.—Western slopes of the Cordillera Oriental in the departments of Boyacá, the Santanders, and southern Magdalena, Colombia.

Characters.—As in *poliopus* but with underparts sharply defined white, the hind feet whitish, slightly marked with brown.

Remarks.—The type was "collected by a native." It is certain that it was not taken at an altitude of that of Muzo itself (1,240 meters) but must have come from somewhere farther down the valley. Four females and one male from Guamalito, near El Carmen, Norte de Santander, collected by the author, agree with the description of *chrysaeolus*. This race is distinguished from *poliopus*, and *oconnelli* of Villavicencio, east of Bogotá, by the absence of dark markings on the white underparts and by its paler hind feet.

Specimens examined.—Five, from Guamalito, Norte de Santander, all in the collection of the United States National Museum.

PROECHIMYS GUYANNENSIS MAGDALENAE, new subspecies

Holotype.—Adult male, skin and skull, U. S. N. M. No. 280170; collected June 20, 1943, by Philip Hershkovitz; original No. 2098.

Type locality.—Río San Pedro, a small stream in the northern foothills of the Cordillera Central, above the village of Norosí, altitude 178 meters, department of Bolívar, Colombia.

Distribution.—Known only from the type locality and the lowlands west of the Río Magdalena near Norosí.

Characters.—Most nearly related to *panamensis* of Panama, and *colombianus* of the Chocó; distinguished from them by coarser mixture of black and ochraceous of back, fore and hind feet white with brown markings, not nearly uniformly brown; hamular processes narrower. Formula of enamel pattern $\frac{3-3-3-3}{(3-4)3-3-3}$.

Description of holotype.—Back Ochraceous-Orange mixed with black, sides of body Ochraceous-Buff, under surface sharply defined white; outer and inner sides of hind legs dark brown punctulated with ochraceous, hind feet white marked with brown; the brown line of outer sides of foreleg extending onto white forefoot; rostrum dark

brown mixed with buffy, cheeks buffy, eyes ringed with dark brown. Tail black above, white beneath.

Measurements (in millimeters).—Those of the holotype followed by the means and extremes of the adults of the type series, including the holotype. Head and body, 239, 243 (217–278, ten specimens); tail, 164, 173 (150–192, seven specimens); hind foot, 51, 50.6 (45–53, ten specimens); ear, 24, 25 (22–28, nine specimens); greatest length of skull, 59.2, 57.3 (52.3–63.4, eleven specimens); zygomatic breadth, 26.4, 26.3 (24.7–28.4, eight specimens); length of nasals, 22.0, 21.5 (20.0–23.5, eleven specimens); alveolar length of molar row, 8.7, 8.3 (7.8–8.9, twelve specimens).

Coloration of the paratypes.—More brightly colored than any of the Colombian races of *guyannensis* found east of the Río Magdalena. As usual in the species, the individual becomes paler as it becomes older. Subadults acquiring the spiny pelage show more black on the back. With the establishment of the adult pelage, the black terminal portions of the spines become less prominent as the ochraceous bands of the soft hairs become broader, the hairs themselves, longer. In all specimens the underparts are sharply defined white, the hind feet white more or less marked with brown.

Remarks.—Of the races of *guyannensis* found west of the Río Magdalena in Colombia, and in western Ecuador and Central America, only the extremely pale *decumanus* of Ecuador is markedly different in external characters. Cranially there is little basis for making distinctions. In the enamel pattern they all agree in having three folds in the lower molars, while some of the Central American forms including *panamensis*, and *calidior* of western Ecuador, tend to retain the fourth fold in the last two upper molars, and in the lower premolar. In dental characters, *magdalenae* shows its nearer relationship to the western forms than to *mincae* and *chrysaeolus* which are much nearer geographically, but on the opposite side of the Río Magdalena.

Specimens examined.—Nineteen (13 males, 6 females) all in the collection of the United States National Museum. Río San Pedro, 17 (one with skull only); Norosí, 2 (one with skull only).

PROECHIMYS HENDEEI Thomas

Proechimys hendeei Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 18, p. 162, 1926

Type locality.—Puca Tambo, Chachapoyas district, Amazonas, Peru.

Distribution (of the species).—Known only from the Amazonian region of Ecuador and Peru.

Characters (of the species).—Upperparts ochraceous to tawny with a mixture of black, the median dorsal area more or less as in *guyannensis* but with spines weaker, less prominent. Underparts, in

the few known adult specimens, sharply defined white. Fore and hind feet thinly haired, white to brown. Tail sparsely haired, the large scales plainly visible. Palatal notch extends anteriorly to a plane on level with middle of M^2. Enamel pattern of molariform teeth, $\frac{3-3-3-3}{4-3-3-3}$.

Comparisons.—Distinguished from western Amazonian representatives of *P. guyannensis* by consistently sharply defined white underparts (more specimens may void this character), relatively longer tail, deeper incision of palatal notch, flatter, less inflated audital bullae, elongate, not squarely formed, hamular processes, and posterior ends of lips of incisive foramina converging toward midline.

Remarks.—Within the range of *hendeei* a large number of forms of *Proechimys* have been described. Among them the following are subspecies of *P. guyannensis* (composite): *semispinosus*, *brevicauda*, *gularis*, *pachita*, *rattinus*, and *hilda*. The author took specimens of *P. hendeei*, probably assignable to *P. h. nigrofulvus* Osgood, together with specimens of *P. guyannensis gularis* from the same trap lines on the banks of the Río Napo, Ecuador. The type of *nigrofulvus* comes from the typical region of *gularis*, on the Río Bobonaza. *P. "hendeei" elassops* Osgood from southeastern Peru is a *guyannensis* with a superficial resemblance to *hendeei*. The description of *P. rattinus* from the Río Ucayali, Peru, was based on the skull of an adult female (designated as the type) and the skin of an immature female. As already indicated, the type skull is referable to the species *guyannensis*. The skin, on the other hand, agrees closely with that of the type of *P. hendeei* and either represents that species or a parallelism akin to that noted in *elassops*.

PROECHIMYS QUADRUPLICATUS, new species

Holotype.—Adult female, Univ. Michigan Mus. Zool. No. 80080; collected October 21, 1936, by Philip Hershkovitz; original number M635.

Type locality.—Llunchi, an island in the Río Napo, about 18 kilometers below the mouth of the Río Coca, eastern Ecuador.

Distribution.—Amazonian region of Ecuador and northern Peru.

Characters.—Upperparts Ochraceous-Orange mixed with black, the median dorsal area entirely black, the black tipped spines overlaying the soft annulated hairs. Underparts sharply defined white; upper surface of fore and hind feet dark brown with a sparse covering of minute silvery hairs. Tail almost naked. Skull as in *P. guyannensis;* enamel pattern of molariform teeth, $\frac{4-4-4-4}{4-3-3-3}$.

Comparisons.—Distinguished from *P. ignotus*, the only other described form of the *Quadruplicatus* group, by richer coloration and by the well-defined median dorsal band.

Description of holotype.—Back and head Ochraceous-Orange mixed with black, a broad band of stiff black-tipped spines on middle of back extending as a line of softer spines over rump to base of tail; crown and rostrum heavily lined with black; sides like back but with a lighter mixture of black and becoming paler toward the sharply defined white underparts. Inner side of thigh Cinnamon-Brown, hind foot brown; foreleg and forefoot paler. Tail above dark brown, beneath sharply defined flesh color.

Measurements (in millimeters).—Those of the holotype followed by the means and extremes of the adults, including the holotype, of the type series. Head and body, 220, 228 (224–234, seven specimens); tail, 162, 158(152–171, five specimens); hind foot, without claw, 48, 48(46–51, seven specimens); ear, 22, 24(22–26, seven specimens); greatest length of skull, in two paratypes, 54.4, 60.0; zygomatic breadth, 26.5, in three paratypes, 27.2, 27.6, 28.5; length of nasals, in four paratypes, 20.4, 23.0, 23.3, 25.0; alveolar length of molar row, 9.3, 9.2(8.7–9.6, seven specimens).

Remarks.—Specimens of *P. guyannensis gularis* and *P. hendeei* were taken in the same localities as those of *P. quadruplicatus*. The individuals representing the three species are quite readily distinguished from one another. However, most of the characters that separate *P. quadruplicatus* from them lose their value when comparisons are extended to members of the same species from outlying regions. The composite nature of *P. guyannensis* contributes considerably to this difficulty. Nevertheless, *quadruplicatus* is always distinguishable from both *guyannensis* and *hendeei* by the pattern of its molariform teeth.

The dental characters upon which specific distinction is based are not limited to *P. quadruplicatus*. Isolated populations of the *quadruplicatus* group occur in the Amazonian region and in Central America. As noted, the spiny rat recently described by Kellogg as *P. "semispinosus" ignotus*, from Pearl Island, off the coast of Panama, is referable to this group. The *Proechimys* with the quadruplicate pattern of the molariform teeth occurring on the mainland of Central America cannot be properly identified without comparing specimens with the types of all previously described forms from that region. The teeth of the type of the Costa Rican *rubellus* are too worn for exact determination of their pattern. The writer's notes on the types of *centralis* and *chiriquensis* lack this data, and it is to be presumed that these rats, like *panamensis*, do not show the complete quadruplicate pattern. Reliance cannot be placed upon "topotypes," or even "paratypes," for dental determinations, as two or more species of very similar appearing spiny rats may occur in the same locality.

No doubt additional specimens of *P. quadruplicatus* are represented in museum collections. Osgood (1944, p. 200) has given a description

of the enamel pattern of a series of spiny rats from Lagunas, eastern Peru, which agrees with this species. These Peruvian rats were assumed to be representatives of *P. semispinosus*.

Specimens examined.—Fourteen (5 males, 9 females, of which only 7 are adult), all specimens in the collection of the University of Michigan Museum of Zoology, Nos. 80068–80081, inclusive.

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A SYNOPSIS OF THE LARVAEVORID FLIES OF THE GENUS EUDEJEANIA[1]

By Curtis W. Sabrosky

The large and heavily spined flies of the tribe Dejeaniini, which reach their greatest development in the Andean mountains, have always attracted the attention of students of the Diptera. In an attempt to identify a number of specimens from Colombia, it proved so extremely difficult to name and to decide upon the status to be accorded the various forms of *Eudejeania* Townsend that a study was undertaken of the rather considerable material at hand. In the interpretation of older descriptions, it is necessary for the most part to use color distinctions, but I am convinced from a study of the available material that certain of these may be relied upon in this group.

Genus EUDEJEANIA Townsend

Eudejeania Townsend, Proc. U. S. Nat. Mus., vol. 43, p. 334, 1912. Two species; type by original designation, *E. subalpina* Townsend.

Eudejeania, sensu lato, Engel, Zool. Jahrb., Abt. Syst., vol. 43, pp. 277–292, 1920. Key to seven species and four varieties; genotype cited as *E. pallida* (Robineau-Desvoidy), with *subalpina*, a variety.

Eudejeania Townsend, Rev. Ent., vol. 1, p. 163, 1931. Discussion of the genotype and the Mexican and Central American species.

Eudejeania Townsend, Manual of myiology, pt. 8, pp. 78–79, 1939. Generic diagnosis; said to range in many species from Mexico to Bolivia, at high elevations.

[1] The material upon which this study was based is contained in the collection of the U. S. National Museum and in an interesting collection of flies kindly submitted for determination by Hernando Osorno Mesa, Instituto de Ciencias Naturales, Ciudad Universitaria, Bogotá, Colombia.

Eudejeaniops BLANCHARD, La Plata Mus. Rev., new ser., vol. 2, pp. 353–357, 1941. Four species, two of them new; type by original designation, *Eudejeaniops pseudopyrrhopoda* Blanchard. New synonym (?).

The genus was erected by Townsend (1912) for two new species from Peru, *E. subalpina* and *E. nigra*, the former being designated as genotype. Engel (1920) revised the genus, listed a number of species, and presented a key to seven species and four varieties, some of which are now referred to other genera. In 1941 Blanchard proposed the name *Eudejeaniops* for two new species plus *E. pallipes* (Macquart) and *E. pyrrhopoda* (Engel), distinguishing his genus from *Eudejeania* mainly by the presence in the former of proclinate frontoorbital bristles in the female.

The presence or absence of these bristles was often used by Townsend as an important generic character. Townsend's conception of *Eudejeania* (1939, p. 78) was that neither sex possessed these bristles, which was true of the species that he designated as genotype (*subalpina*) but not of the second species originally included (*nigra*). He stated also that the genus ranged in many species from Mexico to Bolivia, and he indicated that his concept included Engel's several forms of *pallipes*. In reality, however, all the latter have proclinate frontoorbitals in the female sex. In fact, of all the species considered in this study only *subalpina* lacks them.

It is readily apparent from available material that the character is rather variable in this particular group. In a sample series of 25 females of one species (*aldrichi*) from Bogotá, 16 had two pairs of frontoorbitals, 3 had one pair, and 6 were asymmetrical (1 on one side and 2 on the other, in one individual with 3 and 2). Two males were found with a fully developed bristle on one side, and one male with a complete pair of bristles. Similar variation has also been observed in the other species. In view of the considerable variation exhibited in the abundant material before me, therefore, I do not accept the character by itself as a criterion of generic value. In the key (p. 153) the use of the character has been avoided except as a last resort in one instance.

Curran[2] distinguished *Eudejeania* from *Dejeania* by the lack of acrostichal bristles in the former, though Townsend (1939, p. 78) stated that one pair of presutural acrostichals was a generic character for *Eudejeania*. Actually the number of both acrostichal and dorsocentral bristles is highly variable in this particular genus and cannot be relied upon. Detailed notes on this will be found under *E. aldrichi*.

The species of *Eudejeania* are remarkably similar in structure and habitus, and it seems unnecessary to describe the species here in the

[2] Families and genera of North American Diptera, p. 423, couplet 24, 1934.

detail usually associated with descriptions of Larvaevoridae. Except for the points in which variation has been noted, the generic diagnosis of Townsend (1939, p. 78) will apply to all the species herein considered in *Eudejeania.* Along with other structures, the male genitalia are rather uniform throughout the genus. Some differences have been observed, especially in the shape and proportion of the fused anal forceps, but they are of a comparative nature and are not so readily defined as the characters that have been employed in this study. Insofar as differences can be observed, they corroborate the status of the species recognized here.

A diagnostic key to the species of the genus follows the systematic discussion of the valid species of the genus (p. 153).

1. EUDEJEANIA NIGRA Townsend

Eudejeania nigra Townsend, Proc. U. S. Nat. Mus., vol. 43, p. 335, 1912 (Peru, 7,800 feet).

Eudejeania alpina Townsend, Psyche, vol. 20, p. 106, 1913 (Peru, 12,000 feet). New synonym.

I have compared the types of the two species in the collection of the United States National Museum, but I am unable to find any differences to justify regarding them as distinct. It is possible, of course, in view of the considerable difference in elevation involved, that were long series of specimens available one might find some consistent even if minor differences. At present I can recognize no such differences. The essential characteristics are as follows:

Body entirely black or dark brown-black; parafacials, cheeks, and occiput yellowish to smoky golden, the occipital hairs yellow; width of front in the male equals 0.36 the width of the head; palpi orange-yellow; third antennal segment black, the basal segments brown, narrowly orange about the juncture of the second and third; wings heavily browned; subepaulet (basicostal scale) brownish yellow to orange; legs entirely reddish yellow, the bristles and hairs of all tibiae and tarsi the same; dorsal (extensor) surface of the hind tibia, between the anterodorsal and posterodorsal rows, glabrous except for a few pale hairs at the extreme base; hind tibia with a row of 8–10 anterodorsal bristles of varying lengths; large species, averaging 16–17 mm. in body length.

Townsend described *E. alpina* as having entirely black antennae, but the type and paratype actually have the second antennal segment reddish on the distal fourth. The character is not significant, and it is mentioned only because it might be pointed out from the description alone as an apparent difference.

Besides the two type series (♂, 2 ♀ of *nigra*, 2 ♀ of *alpina*), there are four specimens in the National Museum collection that seem to be-

long here. They were labeled by Townsend as a variety of *E. punensis*, but their name was never published. All are from Peru: Female, Cuzco, 11,500 feet, July 4, 1911 (Yale Peruvian Exped.); three females, Matucana, 8,000 feet, May 1, 1914, August 1 and August 16, 1913 (C. H. T. Townsend).

2. EUDEJEANIA PUNENSIS Townsend

Eudejeania punensis TOWNSEND, Psyche, vol. 20, p. 105, 1913 (Peru, 12,000 feet).

This species was based on a long series of specimens, of which the holotype, 30 paratypes, and 5 topotypical specimens that may have been paratypes but are not so labeled are in the collection before me. There is only one male in the entire series (one of the topotypes).

The species is easily distinguished from the other species of *Eudejeania*, except *pallipes*, by its consistently smaller size and from all the known species by the yellowish appearance of the wings, especially toward the base. In reality, the wing membrane is entirely brown as in the other species and is only slightly paler than the others, but the veins are decidedly yellow. On the basal third of the wing, where the veins converge and are stronger, the result is a conspicuous yellow appearance contrasting strongly with the deep black of the body. Further, the species may be characterized as follows:

Body entirely black or dark brown-black; parafacials, cheeks, face, and epistoma yellow; occiput yellow to dark gray, with yellow hairs; width of the front at the vertex in the male equal to 0.34 the width of the head; palpi bright orange-yellow; first and second antennal segments bright reddish yellow, the third black except narrowly at the base; subepaulet orange to brown; legs entirely reddish yellow, the bristles and hairs of the tibiae and tarsi concolorous; bristles and hairs of the hind tibia almost as described for *E. nigra*, but the extensor surface sometimes with pale hairs on the proximal half; smaller species, the body length consistently about 14 mm.

3. EUDEJEANIA PYRRHOPODA Engel

Eudejeania pallipes var. *pyrrhopoda* ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, pp. 281, 287–289, 1920 (Peru, Colombia, Bolivia).

Eudejeaniops pyrrhopoda (Engel) BLANCHARD, La Plata Mus. Rev., new ser., vol. 2, p. 353, 1941.

Engel credited the name to Schiner, using a manuscript name, but it was never published by the latter. The author is therefore cited as Engel.

It seems evident from Engel's statements on the color of the legs and their bristles, and from the consistency of those characters in the material I have seen, that Engel had at least two species under the name *pyrrhopoda*. I propose to restrict the application of the name to

that species with reddish-yellow legs and black tibial bristles which he regarded as the typical form. His material with these characteristics came from Madre de Dios and Urubamba, Peru [Mus. Dresden]. It is not clear from his notes whether the Bolivian specimens also belong.

I have seen no material which can be identified as *pyrrhopoda* Engel, *sensu stricto*, and further elucidation of the status of this species must await a reexamination of Engel's original specimens, if still in existence, and also an adequate series of Peruvian examples.

It is possible that *E. birabeni* Blanchard (1941) is a synonym (cf. discussion under *birabeni*).

EUDEJEANIA BIRABENI (Blanchard), new combination

Eudejeaniops birabeni Blanchard, La Plata Mus. Rev., new ser., vol. 2, p. 355, fig. 9, 1941 (Argentina).

According to the description *E. birabeni* is a species with black body, black palpi, black femora, and reddish-yellow tibiae and tarsi, the tibiae with reddish-yellow hair but black bristles. As far as I can tell from the description this species is near *E. pyrrhopoda* Engel, as the latter is restricted to the form with reddish-yellow legs and black tibial bristles. Engel's specimens came from Peru and possibly also from Bolivia. Whether the Argentine form is distinct or only a synonym will have to await study of adequate material from the Peru-Bolivia-Argentina region.

4. EUDEJEANIA HUASCARAYANA Townsend

Eudejeania huascarayana Townsend, Insecutor Inscitiae Menstruus, vol. 2, p. 171, 1914 (Peru).

The only specimen that I have seen is the male holotype in the United States National Museum. It is very close to *E. nigra*, differing chiefly in its blackish palpi and narrower front.

Body entirely black, the abdomen with a faint reddish tint; parafacials, cheeks, and occiput golden-yellow, the last with bright yellow hair; epistoma brown; width of the male front at the vertex equal to 0.28 the width of the head, and obviously narrower than in the other species; palpi dark brown-black; antennae entirely black with only narrow reddish margins at the juncture of the second and third segments; subepaulet brown; legs entirely reddish-yellow, the tarsi brighter; tibial and tarsal bristles and hairs reddish-yellow; hind tibia with a row of anterodorsal bristles of varying lengths (broken in the type, but apparently 8–10 as in related species); dorsal surface of the hind tibia apparently with several rows of hairs on the basal half; large species, the body length 17 mm.

5. EUDEJEANIA SUBALPINA Townsend

Eudejeania subalpina TOWNSEND, Proc. U. S. Nat. Mus., vol. 43, p. 334, 1912 (Perú, 11,500 feet); Rev. Ent., vol. 1, p. 163, 1931. Genotype, by original designation.

Eudejeania pallida var. *subalpina* (Townsend) ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, p. 291, 1920.

Body color reddish brown or deep blood red, the disk of the mesonotum centrally brown; parafacials, face, and cheeks light brown, only the facial ridges and a narrow portion of the parafacials near the eyes grayish; occiput grayish yellow, the hairs yellow; width of the male front at the vertex approximately one-third the width of the head (0.33 and 0.36 in two specimens available); female holotype without proclinate frontoorbital bristles; palpi deep black; antennae black, only the second segment tipped with yellow at the apex above; subepaulet orange; legs entirely reddish yellow, tibial and tarsal bristles and hairs the same; hind tibia with a row of 8–10 anterodorsal bristles of varying lengths; dorsal surface of the hind tibia not entirely glabrous, with 1 or 2 irregular rows for at least part of the length; large species, the body length 17–18 mm.

I do not believe that *subalpina* is a variety of *pallida* Robineau-Desvoidy, at least in the sense of Engel (1920). Engel stated that the "typical" form of *pallida* had the tibiae covered with appressed, silvery-white hairs, which would place *pallida* (of Engel!) in an entirely different group of species than *subalpina* Townsend (cf. discussion under *E. pallida*).

Besides the female holotype and a male paratype, both in the National Museum, I have seen only one other specimen of *subalpina*, a male from "Cuesta von Cillutincara," Bolivia, 3,000–3,200 m. (Fassl), determined by Engel himself as *Dejeania pallida* Robineau-Desvoidy and undoubtedly one of the specimens of the same data recorded by Engel (1920, p. 292) as "*pallida* var. *subalpina*." Townsend stated that his two original specimens were males, but the one labeled "type" in the Museum collection is a female.

6. EUDEJEANIA ALDRICHI, new species

Species with bright reddish-yellow legs that contrast vividly with the dark body.

Male, female.—Typical habitus and structure of *Eudejeania*, specifically characterized as follows:

Head dark above, the frontal stripe black and the parafrontals dark brown, the remainder of the head smoky golden to brown; epistoma brown; occipital hair yellow, the long hairs below reddish yellow; palpi black to dark brown; antennae black, the second segment narrowly reddish at the apex, the third segment of the male not broadened

basally; width of the front at the vertex in the male 0.38 times the width of the head (average of 10 males, Bogotá; range, 0.35–0.39); female with 1 or 2 pairs of proclinate frontoorbital bristles, apparently typically two (cf. introductory discussion for note on variation).

Body color to the naked eye as dark as the black species, but under a microscope the abdomen is dark reddish brown, sometimes with a trace of a narrow median black vitta; acrostichal and dorsocentral bristles variable in number (cf. discussion that follows).

Wing membrane and veins brown; subepaulet (basicosta) orange-yellow.

Legs entirely bright reddish yellow, the tibial and tarsal bristles and hairs concolorous, rarely an isolated tibial bristle black; tarsal claws reddish yellow with black tips; hind tibia with a row of 8–10 anterodorsal bristles of varying lengths; tibial hairs short and not so dense as in some of the other species, the ground color of the tibia readily apparent; dorsal (extensor) surface of the hind tibia glabrous except for a few yellow hairs near the base.

Length of the body typically about 16 mm., with a few specimens as small as 13 mm.

Type.—Male, U.S.N.M. No. 58279.

Holotype, male, and allotype, Bogotá, Colombia (B. Guevara), in the United States National Museum. Paratypes: COLOMBIA: 62 males, 115 females, same data as holotype [U.S.N.M.]; female, Usaquén, Cundinamarca, September 30, 1939, alt. 2,700–3,000 m. (H. Osorno); male, ibid., June 9, 1939, same alt. (L. Richter); male, ibid., June 19, 1941, alt. 2,850 m. (L. Richter); male, Páramo Guerrero (Zipaquirá-Pacho), Cundinamarca, September 26, 1940, alt. 3,080 m. (H. Osorno) [Inst. Cien. Nat., Bogotá]. ECUADOR: male, Quito, 2,850 m.; male, 2 females, Aloag, 2,922 m. (F. Campos R.) [U.S.N.M.].

The species is named in honor of the late John Merton Aldrich, for many years curator of insects of the United States National Museum.

This species is superficially quite similar to *E. huascarayana* Townsend, but the latter has a black abdomen and the front of the male is noticeably narrower. The legs appear more strikingly reddish yellow in *aldrichi*, but of course this is a comparative matter that is difficult to grasp except by direct comparison of specimens.

The availability of the fine series of this species from one locality (Bogotá) made it possible to study the variation in certain characteristics that have usually been regarded as significant. For this purpose, a sample of 50 specimens, 25 of each sex, was tabulated.

It was at once apparent that these flies exhibit a considerable degree of variation in chaetotaxy, even in characters that have been regarded as of generic significance. This was particularly true in the acrostichal and dorsocentral bristles. If we may judge from predominance

in the present sample, the regular formula seems to be: acrostichals, 1+0 (one pair of presuturals plus none of postsuturals), and dorsocentrals 2+1. In reality, only 10 specimens (20 percent of the sample) possessed this combination. The following list gives the observed formulae for each type of bristle, though it is obvious that there would be a number of different cross combinations of the acrostichal and dorsocentral formulae:

Acrostichals	*Dorsocentrals*
1 + 0, 22 specimens	1 + 1, 6 specimens
0 + 0, 18 specimens	2 + 1, 21 specimens
1 + 1, 1 specimen	3 + 1, 9 specimens
asym.[3] + 0, 7 specimens	2 + 2, 2 specimens
asym.[3] + 1, 2 specimens	3 + 2, 2 specimens
—	asym.[3] 10 specimens
50 specimens	—
	50 specimens

The actual variation was even greater than these figures indicate. Even where the number of bristles was the same on both right and left sides, those present were not always in homologous positions. What is recorded as one pair of presutural dorsocentrals may really be composed on the right side of a bristle in the forward position near the head and on the left of a bristle adjacent to the transverse suture. With such variation there are numerous possible combinations, and many of these were found in the analysis of the sample series.

The characters that have been used in this paper for specific diagnosis were found to be constant in the series or varied only within narrow limits. Although lack of adequate material in most of the other species made a similar detailed treatment impossible, observations on the available specimens indicate that the situation in *aldrichi* is probably typical for this group of flies.

7. EUDEJEANIA ARGYROPUS (Schiner)

Dejeania argyropus SCHINER, Reise *Novara*, Diptera, p. 337, 1868.
Eudejeania pallipes var. *argyropus* (Schiner) ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, p. 281, 288, 1920.

Eudejeania argyropus is one form upon which there has been general agreement. It is the only species I have seen with the combination of entirely black legs, silvery hairs covering the tibiae and tarsi, and the parafacials smoky golden ("goldbraun" of Schiner).

Body color deep black; parafacials, cheeks, and occiput smoky golden, the occipital hairs yellow except on the lower third; palpi deep black; antennae entirely black; subepaulet orange-yellow; legs entirely

[3] Asymmetrical, the number of bristles not the same on left and right sides of the same individual. This was observed in the presutural acrostichals and in both presutural and postsutural dorsocentrals.

black in ground color, the tibiae and tarsi densely covered with silvery hairs; tibial bristles black; hind tibia with two strong anterodorsal bristles, and sometimes a weak third basad of them; dorsal surface of the hind tibia thickly covered with hairs on its entire length.

Material examined, 8 specimens: COLOMBIA: 2 males, 1 female, Monserrate, Bogotá, May 2, 1940, alt. 2,700–3,000 m. (H. Osorno) [Inst. Cien. Nat.]; male, 3 females, Bogotá (B. Guevara) [U.S.N.M.] ECUADOR: Male, Aloag (F. Campos R.) [U.S.N.M.].

8. EUDEJEANIA PALLIPES (Macquart)

Dejeania pallipes MACQUART, Diptères exotiques . . ., vol. 2, pt. 3, p. 191, pl. 2, fig. 9, 1843; suppl. 1, p. 371, 1846 (pagination of Mem. Soc. Roy. Lille; pp. 34 and 143, respectively, in the separate work.)

Eudejeania pallipes (Macquart) ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, pp. 281, 287–289, 1920.

Eudejeania pallipes (Macquart) TOWNSEND, Manual of myiology, pt. 8, p. 79, 1939.

Engel considered *pallipes*, *sensu stricto*, to be a form with whitish-yellow tarsi, tibiae gray black in ground color but covered with silvery hairs, and brown-black femora. In the light of present knowledge of variation in the group, Macquart's brief description ("Pieds d'un jaune pâle; cuisses antérieures testacées") shows that Engel quite probably misidentified the species.

Macquart's type came from Bogotá, and we are fortunate in having in the National Museum collection a long and unusually fine series of specimens of *Eudejeania* from that vicinity. Two species are present in numbers, presumably being common there, and either of these might have been the original of Macquart's species. One species, labeled *pallipes* by Aldrich, has orange tibiae with black bristles and orange to brownish femora. This is apparently the form determined as *pallipes* by Van der Wulp,[4] who also had material from Bogotá in addition to specimens from Costa Rica and Panama. The other species has entirely reddish-yellow legs with bristles and hairs of the same color. The latter might have been *pallipes* of Macquart, but since the type of the species was long since lost and that point can never be determined I believe it best to continue the Van der Wulp and Aldrich identification of the species.

Engel recognized only one species of the black form with black palpi, namely *E. pallipes* (Macquart), and considered *melanax* as a synonym and *argyropus* and *pyrrhopoda* as varieties.. Townsend (1939, p. 79), on the other hand, expressed the opinion that these "varieties" of Engel "are no doubt valid species, which interbreed at times to produce hybrids with intermediate characters." The present study corroborates Townsend's view that several distinct species are involved.

[4] Biologia Centrali-Americana, Diptera, vol. 2, p. 8, 1888.

The species which I recognize as *pallipes* Macquart (=*pallipes* of Van der Wulp and Aldrich, not of Engel) is characterized as follows:

Body color black; parafacials and cheeks smoky golden to brown; occiput and occipital hairs dark gray-yellow; palpi black; antennae black to dark brown, the second segment narrowly reddish apically; subepaulet orange-yellow; legs predominantly yellow, the tarsi whitish yellow, tibiae yellow to orange, the femora deep orange becoming fuscous toward the base; tibial bristles black; hind tibia typically with three anterodorsal bristles, the basal one weak and sometimes not evident; tibial and tarsal hairs silvery white, but the tibiae less thickly covered than in *argyropus* and others, and ground color readily evident; dorsal surface of the hind tibia with two rows of silvery hairs.

Material examined, 89 specimens: COLOMBIA: 16 males, 67 females, Bogotá (B. Guevara) [U.S.N.M.]; male, 2 females, Monserrate, Bogotá, 2,700–3,000 m., May 2, 1940 (♂), and August 7, 1939 (H. Osorno); 2 females, Usaquén, Cundinamarca, 2,700–3,000 m., October 3, 1939 (H. Osorno) [Inst. Cien. Nat.]; female, above Guasca, Cundinamarca, 3,300 m., February 20, 1942 (E. A. Chapin) [U.S.N.M.].

9. EUDEJEANIA MELANAX (Walker)

Tachina melanax WALKER, List of the dipterous insects in the British Museum, pt. 4, p. 700, 1849 (Venezuela).

Dejeania podiceria RONDANI, Arch. Zool. Modena, vol. 3, No. 1, p. 17, pl. 5, fig. 14, 1864. New synonym.

Dejeania melanax (Walker) AUSTEN, Ann. Mag. Nat. Hist., ser. 7, vol. 19, p. 327, 1907. Gen. ref. from the type.

Eudejeania pallipes (Macquart) ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, p. 287, 1920. *E. melanax* in synonymy, "teste Austen."

The essential characters of *E. melanax* are as follows: Body color black; parafacials and cheeks silvery white except for a small triangular area posterior to the vibrissa; occiput silvery white, the hairs white; palpi black; antennae black, the second segment obscurely reddish at the apex; males with subpyriform third antennal segment, about 1.7 times as broad at the base as at the apex; subepaulet brown to black; femora and tibiae entirely black, the tarsi more or less infuscated apically, at least the metatarsi yellow, in extreme cases only the distal tarsal segment infuscated above; tibiae and tarsi densely covered with silvery white appressed hairs; tibial bristles black; hind tibia typically with three anterodorsal bristles, the basal one weak; dorsal surface of the hind tibia densely covered with hairs on its entire length.

The strongly developed third antennal segment mentioned by Walker is characteristic only of the males, though the females have the segment slightly more expanded than in some of the other species of the genus. The females can be distinguished from those of *argy-*

ropus, which they resemble, by the yellow metatarsi. Both sexes are easily separated from the other known species by having the parafacials and cheeks silvery instead of golden-brown, and the subepaulet black instead of orange-yellow.

I have no hestitation in stating the synonymy of *Dejeania podiceria* Rondani. Fortunately the latter's description emphasized the very characteristics upon which *Eudejeania melanax* is here recognized as distinct, namely, the silvery face and cheeks, legs black but with the base of each tarsus yellow, and the tibiae and tarsi silvery-haired. Most important of all, Rondani noted that the third antennal segment was "pediforme" and presented a figure showing it greatly expanded basally, in profile shaped like a foot. Walker gave no figure of the antenna of *melanax*, but his detailed description of the shape of the third segment leaves no doubt that he had a specimen with this type of antenna.

Engel listed *melanax* as a synonym of *pallipes* on the authority of Austen. He referred Rondani's species to *Eudejeania*, but made no further mention of it in his revision and apparently did not recognize it in the material before him. It would have run in his key to *pallipes* var. *argyropus*.

Material examined, 21 specimens: COLOMBIA: 2 males, 13 females, Bogotá (B. Guevara); female, Meta District, 1932 (B. Guevara) [U.S.N.M.]; male, 2 females, Monserrate, Bogotá, 2,700–3,000 m., June 24, 1939 (♀), and May 2, 1940 (H. Osorno) [Inst. Cien. Nat.]. ECUADOR: male, Baños, Oriente, 8–10,000 feet, January 4, 1923 (F. X. Williams) [U.S.N.M.]. VENEZUELA: male, Mérida (S. Briceno) (labeled *pallipes*, det. Townsend) [U.S.N.M.].

EUDEJEANIA PSEUDOPYRRHOPODA (Blanchard), new combination

Eudejeaniops pseudopyrrhopoda BLANCHARD, La Plata Mus. Rev., new ser., vol. 2, p. 353, 1941 (Argentina.)

According to the description, this species has entirely black body, white pruinose parafacials and cheeks, black palpi, black femora and tibiae, whitish yellow tarsi, black tibial bristles, abundant silvery-white hair on the tibiae and tarsi, black subepaulet (basicosta), and large size (19 mm.).

Of the species before me, this combination of characters applies only to *melanax* Walker. Blanchard's two specimens were females, and it is therefore not possible to say whether the males of *pseudopyrrhopoda* also have the same broad third antennal segment to be found in the males of *melanax*.

Because of the considerable difference in known distribution, I hesitate to suggest that *pseudopyrrhopoda* is a synonym of *melanax* Walker. It is certainly very close, however, and on the basis of

description alone I can find no means of distinguishing them. The status of the former will have to await study of further material, especially of male specimens, from Argentina.

10. EUDEJEANIA NUDITIBIA, new species

A species of the group with silvery hairs on the tibiae and tarsi, differing from all other known species by the absence of anterodorsal bristles on the hind tibia.

Male, female.—Typical habitus and structure of *Eudejeania*, specifically characterized as follows: Head predominantly yellow, the frontal stripe black, parafrontals brown, face whitish, epistoma deep brown, parafacials, cheeks, and occiput smoky golden; occipital hairs yellow above, whitish below; palpi black; antennae black, sometimes the second segment slightly reddish at the extreme apex, the third segment of the male not broadened at the base; width of the front at the vertex in the male approximately one-third the width of the head (0.33); female with proclinate frontoorbital bristles (2 pairs in the holotype, 1 pair in each of the female paratypes).

Body black in ground color, the thorax brown-pollinose above and gray on the sides; no acrostichal bristles, and 2 or 3 pairs of presutural and one of postsutural dorsocentral bristles, at least in the type series.

Wings brown, the veins reddish; subepaulet (basicosta) orange.

Legs: Femora and tibiae black, the tarsi bright yellow, pulvilli sometimes brown; tibiae and tarsi covered with silvery white, appressed hairs, which are especially dense on the tibiae and conceal the ground color except in certain aspects; femoral bristles and hairs and the tibial bristles black, tarsal bristles yellow, and claws yellow with black tips; hind tibia without anterodorsal or other bristles except at the extreme apex.

Length of body (exclusive of spines), 15–16 mm. (Ecuador female only 13 mm.)

Type.—Female, U.S.N.M. No. 58280.

Holotype, female, Usaquén, Cundinamarca, Colombia, 2,700–3,000 m., October 3, 1939 (H. Osorno). Allotype, Bogotá (B. Guevara). Paratypes: female, Baños, Oriente, Ecuador, 8–10,000 feet, January 4, 1923 (F. X. Williams); female, Venezuela, 1923 (De Ballard). Type series in the United States National Museum.

11. EUDEJEANIA ANDEANA, new species

Similar to *nuditibia* and *argyropus*, differing from the former in having anterodorsal bristles on the hind tibia, and from the latter by bright yellow tarsi.

Female.—With the typical habitus and structure of *Eudejeania*, agreeing with the description of *E. nuditibia* in all particulars except the following: Thorax dark brown-black, virtually concolorous with the abdomen; three pairs of presutural and two of postsutural dorsocentral bristles, though these figures are probably not significant in view of the known variation in the group; subepaulet dark orange to brown; silvery hairs on the tibiae not as dense as in *nuditibia* and other species, the ground color easily seen; hind tibia with four anterodorsal bristles, the distal bristle strong, the others progressively weaker toward the base of the tibia.

Type.—Female, U.S.N.M. No. 58281.

Holotype, female, "Cuesta von Cillutincara," Bolivia, 3,000–3,200 m. (Fassl). Paratype, female, Mérida, Venezuela (S. Briceno). Both in the United States National Museum.

This species equals *pallipes* in the sense of Engel, at least in part. The holotype was determined as *pallipes* by Engel himself, and was the specimen cited by Engel (1920, p. 288).

KEY TO THE SPECIES OF EUDEJEANIA[5]

1. Tibiae and tarsi with yellow to reddish-yellow hairs, tibial bristles concolorous except in *pyrrhopoda* and *birabeni*, which have black bristles; legs entirely reddish yellow except in *birabeni*, which has black femora; hind tibia with a row of 8–10 anterodorsal bristles of varying lengths; dorsal (extensor) surface of hind tibia, between anterodorsal and posterodorsal rows, glabrous except for a few pale hairs toward base, sometimes with a row or two of pale hairs extending about halfway to apex of tibia 2

   Tibiae and tarsi with silvery-white hairs, those on tibiae usually dense and concealing ground color; tibial bristles black; femora and tibiae black, except in *pallipes;* hind tibia typically with three anterodorsal bristles, basal one weak, occasionally with two or four bristles, or with none (*nuditibia*); dorsal surface of hind tibia usually entirely concealed by silvery hairs, with at least two complete rows 7

2. Palpi black or dark brown-black 4

   Palpi bright orange to orange-yellow; body entirely black; width of male front at vertex over one-third width of head (0.34–0.36) 3

3. Wings entirely brown; first and second antennal segments brown, the latter narrowly orange at apex; large species, body length 16–17 mm. ..... 1. nigra Townsend

   Wing membrane brown but veins yellow, imparting to wing a characteristically yellow appearance toward base where veins converge; first and second antennal segments bright reddish yellow; smaller species, body length rather consistently about 14 mm ..... 2. punensis Townsend

4. Bristles of tibiae reddish yellow, concolorous with hairs (rarely an individual bristle black) 5

   Bristles of the tibiae black; body black ..... 3. pyrrhopoda Engel
   birabeni (Blanchard)

[5] For species that have been placed in *Eudejeania* but are not included in the key, see the discussions under *pallida* Robineau-Desvoidy, *mexicana* Robineau-Desvoidy, *montana* Van der Wulp, and *atrata* Van der Wulp.

5. Abdomen blood red to dark reddish brown; width of male front at vertex one-third or more width of head (0.33–0.39)---------- 6
Abdomen black; at vertex male front noticeably narrower than in any of the other species (holotype, 0.28 head width)-----4. **huascarayana** Townsend
6. Abdomen blood red; thorax reddish brown, disk of mesonotum dull gray-black; female without proclinate frontoorbital bristles.
5. **subalpina** Townsend
Abdomen dark reddish brown, appearing to naked eye little different from black species; thorax black; female with 1 or 2 pairs of proclinate frontoorbitals----------6. **aldrichi**, new species

(Tibiae and tarsi with silvery hairs)

7. Legs entirely black in ground color; parafacials and cheeks of smoky golden color; silvery hair on tibiae quite dense----------7. **argyropus** (Schiner)
Legs with at least metatarsi yellow in ground color---------- 8
8. Femora and tibiae entirely black in ground color; silvery hair on tibiae dense and closely appressed, concealing the ground color from direct view------- 9
Legs predominantly yellow to orange in ground color, femora somewhat darker and infuscated toward base; tibiae not so thickly covered with silvery hair, ground color quite evident----------8. **pallipes** (Macquart)
9. Parafacials and cheeks smoky golden; tarsi entirely yellow; third antennal segment of male only slightly broadened at base, if at all---------- 10
Parafacials and cheeks predominantly silvery white; tarsi more or less infuscated apically, but at least the basal segment yellow; third antennal segment of male strongly broadened dorsally at base--9. **melanax** (Walker)

(The male of *pseudopyrrhopoda* Blanchard is unknown, but the female will come to this point in the key.)

10. Hind tibia without bristles except at extreme apex.
10. **nuditibia**, new species
Hind tibia with four slender but distinct anterodorsal bristles.
11. **andeana**, new species

SPECIES OF UNCERTAIN STATUS OR TRANSFERRED ELSEWHERE

EUDEJEANIA PALLIDA (Robineau-Desvoidy)

Dejeania pallida Robineau-Desvoidy, Diptères des environs de Paris, vol. 1, p. 653, 1863 (Mexico).

Eudejeania pallida (Robineau-Desvoidy) Engel, Zool. Jahrb., Abt. Syst., vol. 43, p. 291, 1920.

Eudejeania pallida (Robineau-Desvoidy) Townsend, Rev. Ent., vol. 1, p. 163, 1931.

Townsend reported that the type was lost, but he doubted that Engel was correct in determining material from the high Andes under a name proposed for a Mexican species. All that can be said from the description is that the abdomen was reddish brown and the legs reddish. Engel stated that the typical form of *pallida* had the tibiae covered with appressed, silvery-white hair, but inasmuch as that appearance is so striking, it scarcely seems credible that Robineau-Desvoidy would have failed to mention it had his specimens been so ornamented. *E. pallida* of Engel belongs in the group of species with *pallipes* Macquart, *argyropus* Schiner, *et al.*, whereas it appears probable that *pallida*

Robineau-Desvoidy *sensu stricto*, was similar to *E. subalpina* Townsend. I agree with Townsend, however, that it is unlikely that the latter two are synonymous. It is possible that *pallida* might be recognized if adequate Mexican material could be studied, but I cannot associate the name with any of the South American specimens before me.

EUDEJEANIA MEXICANA (Robineau-Desvoidy)

Dejeania mexicana ROBINEAU-DESVOIDY, Diptères des environs de Paris, vol. 1, p. 652, 1863 (Mexico).

Eudejeania mexicana (Robineau-Desvoidy) TOWNSEND, 1931, Rev. Ent., vol. 1, p. 163, 1931. Generic reference; type lost.

Townsend referred the species to *Eudejeania*, linking it with *pallida* as one of the species with brownish-red abdomen. I am unable to recognize it from the description, or to associate it with any of the species before me.

(?) EUDEJEANIA ATRATA (Van der Wulp)

Dejeania atrata VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2, p. 8, pl. 1, fig. 2, 1903 (Costa Rica).

Eudejeania atrata (Van der Wulp) ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, p. 279, 1920.

Eudejeania atrata (Van der Wulp) TOWNSEND, Rev. Ent., vol. 1, p. 163, 1931. "Apparently distinct from *pallida* R.-D."

It seems to me quite probable that this species is not a true *Eudejeania*, or, if it should prove to belong, it must be very different from the known species, according to the description. The abdomen was said to be "cordiform," whereas *Eudejeania* has the abdomen subquadrate, with the apex quite broad and more or less emarginate on the midline. Van der Wulp also stated that his species had the "claws entirely black," whereas in all the species of *Eudejeania* known to me the claws are bright yellow with only the slender apical fourth to third of each claw black. As a further difference from any of the species except *argyropus*, it may be noted that Van der Wulp said the legs were "totally black," but he made no mention of the silvery-white hairs on the tibiae and tarsi that are so characteristic a feature of *argyropus*, and for that matter of all the other species of *Eudejeania* which have both femora and tibiae black. From the detail of Van der Wulp's descriptions of color, we may safely assume that he would have mentioned the presence of such hairs had they occurred on his material.

PROTODEJEANIA ECHINATA (Thomson)

Jurinea echinata THOMSON, Eugenies Resa, Diptera, p. 516, 1868 (California).

Dejeania montana VAN DER WULP, Tijdschr. Ent., vol. 35, p. 190, 1892 (Mexico). New synonym.

? *Eudejeania montana* (Van der Wulp) ENGEL, Zool. Jahrb., Abt. Syst., vol. 43, p. 279, 1920. Generic reference with a question.

Dr. Aldrich had noted in his card catalog at the United States National Museum that *montana* was a synonym of *Protodejeania echinata* (Thomson), from two cotypes of *D. montana* sent by the British Museum and now in the Museum at Washington. The cotypes run directly to *Protodejeania* in Townsend's "Manual of Myiology" (pt. 3, p. 179).

The synonymy suggested by Dr. Aldrich is accepted, and *montana* is eliminated from consideration under *Eudejeania.*

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THE PYCNOGONIDA OF THE WESTERN NORTH ATLANTIC AND THE CARIBBEAN

By Joel W. Hedgpeth

Since Wilson's "Report on the Pycnogonida of New England and Adjacent Waters" (1880) and his "Report on the Pycnogonida of the *Blake*" (1881), there has been no comprehensive treatment of the pycnogonids of the eastern United States and the deeper waters of the western Atlantic.[1] The extensive dredging operations of the steamer *Albatross* from 1883 to 1887 off the eastern United States brought up a large assortment of pycnogonids, several of them undescribed at the time. These were laid aside by the late Prof. A. E. Verrill, who planned a report on them. This did not materialize, however, except for a preliminary list (1885) on the first season's work of the *Albatross*.

Taxonomic work on the group from western Atlantic waters since that time is represented by two short papers (Verrill, 1900; Cole, 1904b) on species from Bermuda, and one (Cole, 1906a) on a Bahama species. More recently, Giltay (1934d) described another species from Bermuda, but his plan to work up the United States National Museum collections from the Caribbean region was cut short by his untimely death.[2] The pycnogonids of the Woods Hole region are well known

[1] Edmund B. Wilson, 1856–1939, the great morphologist, embryologist, and teacher, noted for his treatise "The Cell in Development and Inheritance." His early work with the Pycnogonida has been recognized by Schimkewitsch (1887, 1889), who dedicated *Achelia wilsoni*, a species from southern Argentina and Chile, to him. See H. J. Muller: "Edmund B. Wilson—An Appreciation," Amer. Nat., vol. 77, pp. 5–37, 142–172, 1943.

[2] Dr. Louis Giltay, 1903–1937, ichthyologist and arachnologist. For an obituary, photograph, and bibliography, see V. van Straelen: "Louis Giltay, Notice biographique avec liste bibliographique." Bull. Mus. Roy. Hist. Nat. Belgique, vol. 14, No. 23, pp. 1–8, 1938.

as a result of the biological survey of that region by Sumner, Osburn, and Cole (1913), and the plankton studies by Fish (1925), but the long stretch of coast from Long Island to Key West and the Caribbean region have been inexplicably neglected.[3] This neglect was emphasized by Timmermann's (1932) study of the fauna of the sargassum in the mid-Atlantic, which demonstrated beyond question the pelagic occurrence of two common pycnogonids, *Anoplodactylus petiolatus* and *Endeis spinosa*. Because of our incomplete knowledge of Caribbean pycnogonids, Timmermann was unable to conclude whether these species originated from the European side of the Atlantic or the West Indian region.

Although contributing little to the zoogeography of pycnogonids, Cole's papers on the habits of *Anoplodactylus lentus* (1901, 1906b) and *Endeis spinosa* (1910) and Dawson's (1934) account of the corpuscles of the blood of *Anoplodactylus lentus* should be mentioned. Another important paper is T. H. Morgan's doctoral thesis on the embryology of Woods Hole pycnogonids (1891), which is a fundamental contribution to our knowledge of the subject.[4]

This review is based on the *Albatross* collections in the United States National Museum and the Peabody Museum of Yale University, comprising several hundred specimens; a large series of collections from the earlier dredgings of the Fish Commission in New England waters (including many of the lots cataloged in Wilson's reports), and more recent material in the National Museum from Chesapeake Bay to the northern coast of South America, including the collections from the Tortugas Laboratory of the Carnegie Institution of Washington by various collectors over a period of years: C. H. Edmondson, 1904; Leon J. Cole, 1905, 1906, 1908; Raymond C. Osburn, 1908; Waldo L. Schmitt, 1924, 1925, 1930, 1931, 1932; H. Boschma, 1925; C. R. Shoemaker, 1926. In addition to this material, the collections of the Museum of Comparative Zoology have been placed at my disposal, representing principally the Caribbean work of the *Blake* and the *Atlantis*. Some of this material has been discussed in a preliminary paper (Hedgpeth, 1943b).

For the privilege of examining the National Museum collections and for many other courtesies, I am indebted to Dr. Waldo L. Schmitt, head curator of zoology of that museum. I also wish to thank Dr.

[3] Wilson's *Blake* report discusses the dredgings made north of lat. 32° N. According to Hoek, in his concluding remarks in the *Challenger* Report (1881), the West Indian collections of the *Blake* were sent to Alphonse Milne-Edwards along with the Crustacea, and they may still be in the Paris Museum. The material now in the Museum of Comparative Zoology dredged by the *Blake* in the West Indies consists of seven species from eight stations (Hedgpeth, 1943b).

The Pycnogonida of the northeastern United States littoral are adequately represented in W. O. Crowder's manual "Between the Tides," pp. 334–339, figs. 319–326, 1931. The treatment is unusually complete for these obscure animals in a popular work.

[4] It is interesting to note that three eminent American zoologists, E. B. Wilson, Leon J. Cole, and T. H. Morgan, "cut their teeth" on studies of pycnogonids.

Stanley C. Ball, of the Peabody Museum, for the loan of the large collections from that museum, which include many valuable specimens listed in the literature, and Dr. Fenner A. Chace, Jr., formerly of the Museum of Comparative Zoology, for the loan of material and the time he took in my behalf while at Cambridge. The greater part of this study was carried out during the author's residence in California, 3,000 miles from the eastern museums, and required considerable correspondence and shipment of collections back and forth across the continent. This was an imposition on the time and patience of those who were kind enough to help me, and their generous cooperation has had no small part in making this report possible. Also I wish to thank John C. Armstrong, assistant curator of invertebrates in the American Museum of Natural History, for the loan of the pycnogonids in the collections of that museum. I am particularly indebted to Dr. Louis W. Hutchins for permission to make use of the collections made by the Woods Hole Oceanographic Institution fouling survey in advance of the comprehensive report on that collection in order that all the species found in the area of this report might be included in it.

CLASSIFICATION

The Pycnogonida constitute an independent class of the Arthropoda, with characters indicating affinities with both the Arachnida and Crustacea.[5] Their systematic position has been well summarized by Marcus (1940b, p. 129): "The Pantopoda do not in any phase possess the crustacean biramous limbs nor the arachnomorphous body composed of cephalothorax (prosoma) with six pairs of appendages and abdomen (opisthosoma). Therefore it seems advisable to consider them as a separate class of the Arthropoda—or the Euarthropoda, if the Malacopoda (Onychophora and Tardigrada) are left aside—and not to include them in the Crustacea or Arachnomorpha (Merostomata and Arachnoidea) and thereby make diagnoses for these classes impossible."

There are about 50 genera and 500 species of pycnogonids, but the group is so compact that many of the families are merely categories of convenience. Although attempts to divide the Pycnogonida into orders have been unsuccessful, there are two general groups. The first group, including the families Nymphonidae, Ammotheidae,

[5] Aside from considerations of personal sentiment and of priority (Pycnogonides Latreille, 1810; Podosomata Leach, 1815; Pantopoda Gerstaecker, 1863), the majority usage of Pycnogonida by English, Scandinavian, French, and American writers overrules the Pantopoda of the German, Russian, and other writers. Norman (1908) resurrected Leach's Podosomata because he did not believe that the name of a class should be derived from that of a genus included in it. Why not? (Cf. Bouvier's (1923, p. 3) passionate comments on the subject.)

In the recent revision of A. S. Pearse's "Zoological Names" (Duke Univ. Press, 1947) it would appear that I have sanctioned the retention of orders, since I am cited as the authority for the pycnogonid names in this brochure. I suspect the author was reluctant to adopt such a radical excision from his list.

Tanystylidae, and Colossendeidae, have ovigers in both sexes. Most of these families are also characterized by the presence of both chelifores and palpi in the adults, although the chelifores are reduced in the Tanystylidae and usually absent in adult Colossendeidae. The second group, comprising the Phoxichilidiidae, Endeidae, and Pycnogonidae, have ovigers only in the male and lack palpi, with the exception of rudimentary knoblike growths in some Phoxichilidiidae. Chelifores are also lacking in the Endeidae and Pycnogonidae. Midway between these groups is the family Pallenidae. Ovigers are present in both sexes in this family, chelifores are present and often well developed, but the palpi are greatly reduced or entirely lacking. In this family is included the genus *Pallenopsis*, which resembles the phoxichilidiid genus *Anoplodactylus* in the possession of tubular femoral cement glands in the male and in the structure of the cephalic segment. *Pallenopsis* has in fact been included in the Phoxichilidiidae by several writers, notably Calman and Gordon.

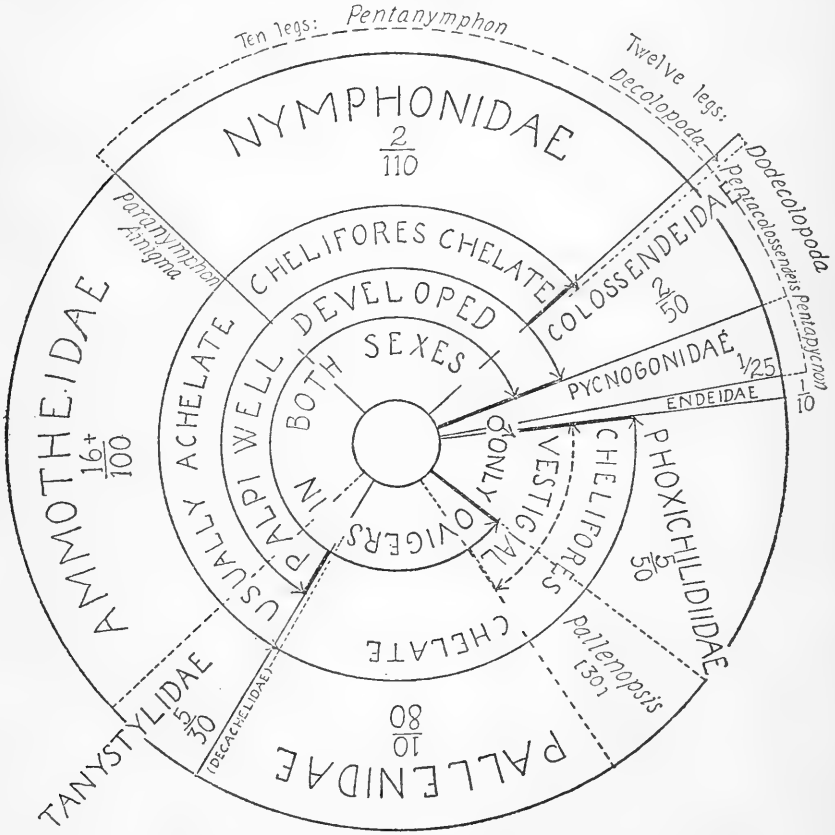

FIGURE 4.—Diagram of the families of Pycnogonida. The fractions indicate genera and species.

The relationships and comparative importance of the families have been discussed at greater length elsewhere (Hedgpeth, 1947). As can be seen from figure 4, which is in the nature of a quantitative as well as qualitative diagram of the families, I have reduced the number of families to eight:

1. Nymphonidae Wilson, 1878.
2. Pallenidae Wilson, 1878.
3. Phoxichilidiidae G. O. Sars, 1891.
4. Endeidae Norman, 1908.
5. Ammotheidae Dohrn, 1881.
6. Tanystylidae Schimkewitsch, 1913.
7. Colossendeidae Hoek, 1881.
8. Pycnogonidae Wilson, 1878.

Although the traditional order of the families in large reports has no particular correlation with the relationships of the families, it seems best to retain it as a matter of convenience.

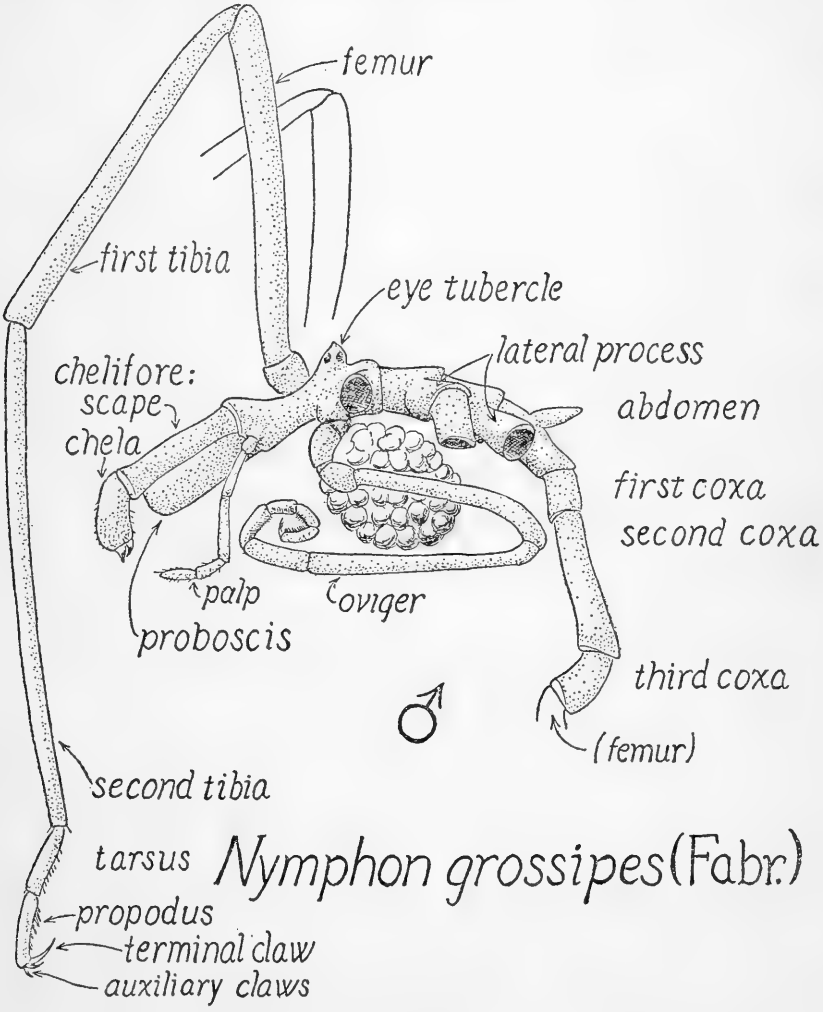

FIGURE 5.—Anatomical characters of a typical pycnogonid.

KEY TO THE FAMILIES OF PYCNOGONIDA

[MODIFIED FROM MARCUS, 1940B, PP. 15–16; SEE FIG. 5 FOR ANATOMICAL CHARACTERS]

1. Chelifores and palpi present 2
   Chelifores or palpi, or both, lacking or greatly reduced 8
2. Chelifores and palpi both well developed 3
   Chelifores or palpi, but not both, reduced 6
3. Palpi 17-20–jointed, first pair of legs with 12 or 13 secondary joints. **Ammotheidae** (*Nymphonella*)
   Palpi not more than 10-jointed; legs 8-jointed; usually with a terminal claw 4
4. Palpi 5-jointed, chelae well developed, *or* palpi 6-9–jointed, chelae small or rudimentary 5
   Palpi 9-10–jointed; 5 or 6 pairs of legs. **Colossendeidae** (Decolopoda, Dodecolopoda)
5. Palpi never more than 5–jointed; chelae well developed, overreaching proboscis; 4 or 5 pairs of legs ..... **Nymphonidae** (p. 179)
   Palpi 6-9–jointed; chelae small, chelifores usually shorter than proboscis. **Ammotheidae** (p. 240)
6. Chelifores 2-3–jointed, chelae well developed; palpi 1-4–jointed. **Pallenidae** (p. 199)
   Chelifores present, but chelae reduced to knobs, palpi 4-10–jointed 7
7. Chelifores 2-3–jointed, shorter than proboscis, chelae reduced. **Ammotheidae** (p. 240)
   Chelifores 1-2–jointed, palpi never more than 7-jointed. **Tanystylidae** (p. 266)
8. Chelifores or palpi lacking, but not both 9
   Both chelifores and palpi lacking 12
9. Chelifores present, palpi lacking 10
   Chelifores lacking, palpi present 11
10. Ovigers 10-jointed, in both sexes ..... **Pallenidae** (p. 199)
    Ovigers less than 10-jointed, in ♂ only ..... **Phoxichilidiidae** (p. 216)
11. Palpi 4-7–jointed; small forms ..... **Tanystylidae** (p. 266)
    Palpi 8-10–jointed; chelifores sometimes persistent; mostly huge deep-water forms ..... **Colossendeidae** (p. 268)
12. Body slender; legs about twice as long as body; auxiliary claws present. **Endeidae** (p. 238)
    Body stout; legs short, not much longer than body; without auxiliary claws; 4 or 5 pairs of legs ..... **Pycnogonidae** (p. 276)

ZOOGEOGRAPHICAL DISCUSSION

The western North Atlantic and Caribbean regions represent two distinct faunal provinces, the Boreal-Arctic and the American Subtropical. These two provinces overlap along the coast of the eastern United States between Cape Cod and Cape Hatteras. The pelagic fauna of the Sargasso Sea and the littoral fauna of Bermuda are ultimately related to the American Subtropical province. This is especially true for the pycnogonids. (See figs. 6, 7.) The collections of pycnogonids from these regions that have been examined for this study include 24 genera and 70 species. All but one of the previously known species are represented in the collections; the missing species is *Nymphopsis anarthra* Loman, described from the Venezuela coast.

The most interesting feature of the fauna of the western Tropical and Subtropical Atlantic is the occurrence of several small species, previously known from the eastern shores of that ocean. In the following discussion this distribution is attributed to the dispersing influence of ocean currents rather than to evolutionary convergence. Certainly the large number of closely related species in the Pycnogonida suggests a tendency toward divergence. On the other hand, the occurrence of decapodous species in widely separated families might be considered an example of convergence, although it is equally possible that it is simply the result of a basic similarity of chromosome pattern among the groups concerned. It may be significant that the distribution of these 10-legged pycnogonids appears to be localized or continuous insofar as it is known, i. e., there seem to be no important gaps in the ranges of the various species. Furthermore, as far as we know, they are restricted to the Antarctic and the Caribbean. I have discussed the problem of 10-legged pycnogonids in greater detail elsewhere (1947).

This zoogeographical discussion is confined to the shallow-water and littoral species, the distribution of which is more subject to geographical features and surface currents than that of the deep-water species. The species of pycnogonids known to occur in the western North Atlantic are listed in table 1.

TABLE 1.—*Distribution of Pycnogonida found in the western North Atlantic and the Caribbean*

[Species in brackets found occasionally in American waters south of lat. 60°. S=surface tow or sargassum records. P=deep pelagic tows]

Species	Boreal-Arctic America, South of 60°	N. Atlantic Basin (A: Azores)	New England, North of Cape Cod	Cape Cod to Hatteras	Bermuda	Hatteras to Bahamas	Caribbean (principally Tortugas)	Brazil	Norway to France (N.=Norway only)	Mediterranean	African coast, Morocco to Cape Verde	Pacific side of Isthmus	Bathymetric range in American waters
NYMPHONIDAE:													
Nymphon spinosissimum (Norman)	X	----	X	------	----	----	----	----	X[N]	------	----	----	*Fathoms* 190–471
hirtipes Bell	X	----	X	------	----	----	----	----	------	------	----	----	25–218
tenellum (Sars)	----	X	----	X	----	----	----	----	------	------	----	----	218–938
grossipes (O. Fabr.?) Kröyer	X	----	X	X	----	----	----	----	X	------	----	----	lit.–677
[*brevitarse* Krøyer	X	----	----	------	----	----	----	----	------	------	----	----	Sublittoral]
longitarse Krøyer	X	----	X	X (428f)	----	----	----	----	X[N]	------	----	----	16–155
strömi Krøyer	X	----	X	X	----	X	----	----	X[N]	------	----	----	7–524
[*elegans* Hansen	X	----	----	------	----	----	----	----	------	------	----	----	314]
rubrum Hodge	?	----	X	------	----	----	----	----	X	------	----	----	Sublittoral
macrum Wilson	X	X	X	X	----	X	X	----	X	------	----	----	35–843
[*sluiteri* Hoek	X	----	(?)	------	----	----	----	----	------	------	----	----	Abt. 100]
giltayi, new species	----	----	X	------	----	----	----	----	------	------	----	----	(?)
floridanum, new species	----	----	----	------	----	----	X[S]	----	------	------	----	----	S–30

TABLE 1.—*Distribution of Pycnogonida found in the western North Atlantic and the Caribbean*—Continued

Species	Boreal-Arctic America, South of 60°	N. Atlantic Basin (A: Azores)	New England, North of Cape Cod	Cape Cod to Hatteras	Bermuda	Hatteras to Bahamas	Caribbean (principally Tortugas)	Brazil	Norway to France (N.=Norway only)	Mediterranean	African coast, Morocco to Cape Verde	Pacific side of Isthmus	Bathymetric range in American waters
PALLENIDAE:													
Callipallene brevirostris (Johnston)	----	----	(?)	X[S]	----	----	X	----	X	X	----	----	*Fathoms* S–28
phantoma (Dohrn)	----	A	----	------	----	----	S	----	X	X	----	----	S
emaciata (Dohrn)	----	----	----	------	----	----	S	----	------	X	----	----	S
acus (Meinert)	X	?	X	X	----	----	----	----	------	------	----	----	499–1,356
Pseudopallene circularis (Goodsir)	X	----	X	------	----	----	----	----	X[N]	------	----	----	Lit.–55
Cordylochele malleolata (Sars)	X	X	X	X	----	----	----	----	------	------	----	----	218–826
longicollis Sars	X	X	----	------	----	X	----	----	------	------	----	----	270–273
Pallenopsis forficifer Wilson	----	----	----	------	----	X	X	----	------	------	----	----	200–352
longirostris Wilson	X	(?)	----	X	----	X	----	----	------	------	----	----	79–841
calcanea Stephensen	P	P	----	------	----	----	----	----	------	------	----	----	500–1,000
schmitti Hedgpeth	----	----	----	------	----	----	X	----	------	------	----	----	20–155
Pigrogromitus timsanus Calman	----	----	----	------	----	X	----	----	------	Suez	----	----	Buoy, 3ft.
PHOXICHILIDIDAE:													
Phoxichilidium femoratum (Rathke)	X	----	X	X	----	----	----	----	X	------	----	----	Lit.–55
Halosoma robustum (Dohrn)	----	----	----	------	----	----	X	X	------	X	----	----	Littoral
Anoplodactylus petiolatus (Krøyer)	----	S	----	------	----	X	----	X	X	X	----	----	S–43
parvus Giltay	----	----	----	X	X	----	----	----	------	------	----	----	12–45
pygmaeus (Hodge)	----	----	----	X	----	----	X	----	------	------	----	----	----------
lentus Wilson	----	----	----	X	----	X	X	----	------	------	----	----	Lit.–150
insignis (Hoek)	----	----	----	------	X	X	X	X	------	------	----	----	3–48
typhlops Sars	----	P	----	------	----	----	X	----	X[N]	------	----	----	582
? *maritimus* Hodgson	----	S	----	------	----	----	(?)	----	------	------	----	----	(?)
polignaci Bouvier	----	----	----	------	----	----	X	----	------	------	X	----	(?)
carvalhoi Marcus	----	----	----	------	----	----	X	X	------	------	----	----	Littoral
evelinae Marcus	----	----	----	------	----	----	X	X	------	------	----	----	Littoral
quadratispinosus Hedgpeth	----	----	----	------	----	----	X	----	------	------	----	----	(?)
stylirostris, new species	----	----	----	------	----	X	X	----	------	------	----	----	Littoral
pectinus, new species	----	----	----	------	----	----	X	----	------	------	----	----	3–10
sp. A (Tortugas)	----	----	----	------	----	----	X	----	------	------	----	----	10
sp. B (Florida)	----	----	----	------	----	----	X	----	------	------	----	----	45
ENDEIDAE:													
Endeis spinosa (Montagu)	----	S, A	----	X[S]	X	X	X[S]	X	X	X	X	----	S–38
AMMOTHEIDAE:													
Achelia spinosa (Stimpson) Wilson	----	----	X	X	----	----	----	----	------	------	----	----	Littoral
scabra Wilson	----	----	X	X	----	----	----	----	------	------	----	----	Lit.–45
gracilis Verrill	----	----	----	------	X	(?)	----	----	------	------	----	----	Littoral
sawayai Marcus	----	----	----	------	----	----	X	X	------	------	----	----	Lit.–25
brevichelifera, new species	----	----	----	X	----	----	----	----	------	------	----	----	410–428

TABLE 1.—*Distribution of Pycnogonida found in the western North Atlantic and the Caribbean*—Continued

Species	Boreal-Arctic America, South of 60°	N. Atlantic Basin (A: Azores)	New England, North of Cape Cod	Cape Cod to Hatteras	Bermuda	Hatteras to Bahamas	Caribbean (principally Tortugas)	Brazil	Norway to France (N.=Norway only)	Mediterranean	African coast, Morocco to Cape Verde	Pacific side of Isthmus	Bathymetric range in American waters
AMMOTHEIDAE—Continued:													
Ammothella rugulosa (Verrill)					X		X	X					*Fathoms* Littoral
marcusi, new species							X						Littoral
Nymphopsis anarthra Loman							X						20
duodorsospinosa Hilton						X	X					X	Lit.–10
Paranymphon spinosum Caullery	X	X		X									349–705
Ascorhynchus armatus (Wilson)				X		X	X					(?)	170–1,374
latipes (Cole)						X	X						200–352
colei Hedgpeth							X						70–80
serratum, new species							X						231
Eurycyde raphiaster Loman						X	X				X		Littoral
Ephyrogymna circularis Hedgpeth							X						565
Heterofragilia fimbriata Hedgpeth							X						476
Calypsopycnon georgiae, new genus and species					(?)								?
TANYSTYLIDAE:													
Tanystylum orbiculare Wilson				X		X	S	X					Lit.–15
calicirostre Schimkewitsch					X							X	Littoral
COLOSSENDEIDAE:													
Colossendeis angusta Sars	X	X		X									86–1,700
colossea Wilson		X		X			X						499–1,374
minuta Hoek			X										811–1,250
macerrima Wilson		X		X									231–1,073
clavata Meinert		X		X									855–1,230
michaelsarsi Olsen		(?)		X							X		858
Pentacolossendeis reticulata Hedgpeth							X						98–110
PYCNOGONIDAE:													
Pycnogonum littorale (Ström)	X		X	X			(?)		X	X	X		Lit.–810
crassirostre Sars	X		X						X[N]				129–207
reticulatum, new species							X					X	Littoral
Pentapycnon geayi Bouvier							X						38

NEW ENGLAND

The southern limit of the characteristic Boreal-Arctic fauna in the western North Atlantic is Cape Cod, and most of the pycnogonids from the New England-Newfoundland region are widely distributed in the colder waters of the North Atlantic (fig. 6). *Nymphon hirtipes*,

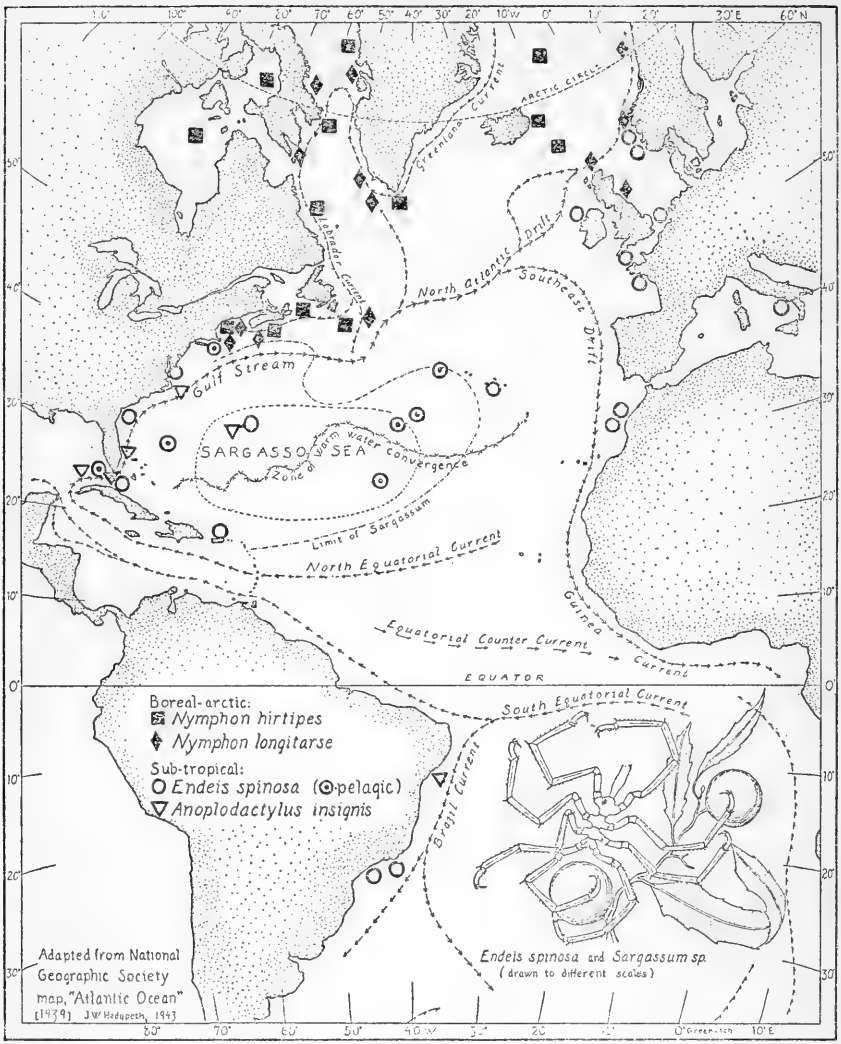

FIGURE 6.—Distribution of various cold- and warm-water pycnogonids (from various sources).

N. longitarse, and *Pseudopallene circularis* are typical species of this region. Except for a single deep-water record for *Nymphon longitarse* at about latitude 40° N., these species are not found south of Cape Cod. There seem to be only two species that might be considered indigenous to the New England region, *Achelia spinosa* and *A. scabra*. But *Achelia spinosa* is considered to be synonymous with the European *A. echinata* by several writers.

Few littoral species have been collected from both the Gulf of Maine region north of Cape Cod and the Woods Hole area immediately

south of the Cape. The species known to occur regularly on both sides of this limiting promontory are *Pycnogonum littorale, Phoxichilidium femoratum, Nymphon grossipes,* and *Achelia spinosa.* Three of these are ubiquitous Boreal species whose southern limit seems to be Long Island Sound.[6]

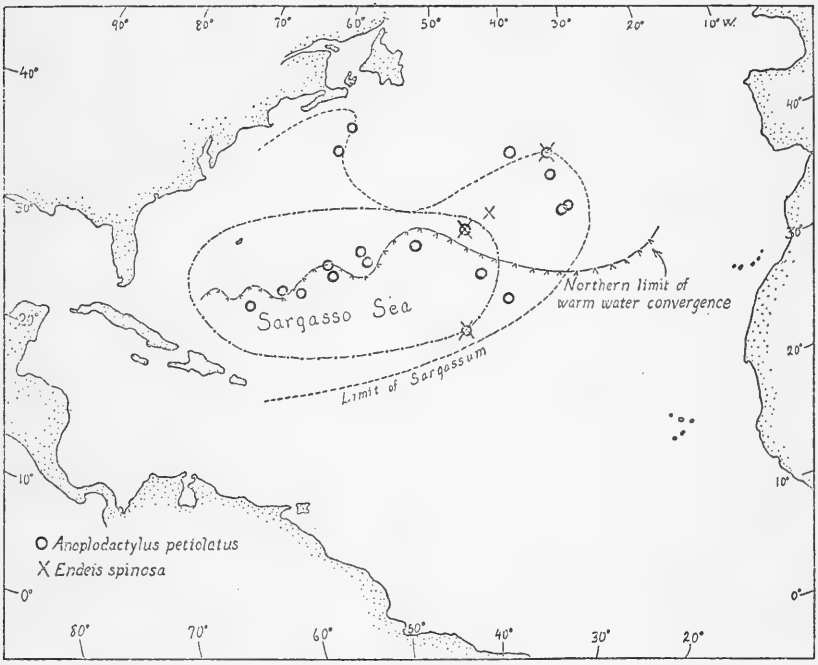

FIGURE 7.—Occurrence of pycnogonids on sargassum in the mid-Atlantic (after Timmermann, fig. 3).

The pycnogonids of Woods Hole are notably few. Only three species are common in that locality: *Tanystylum orbiculare, Callipallene brevirostris,* and *Anoplodactylus lentus.* The last two have been reported from the Bay of Fundy, but both records are of single specimens. They can be considered accidental vagaries if not errors in identification or labeling. All three species are widely distributed southern forms, and Woods Hole represents their northern optimum limit. The pelagic sargassum species *Endeis spinosa* occurs sporadically at Woods Hole when sargassum drifts into that region. Curiously enough, *Anoplodactylus petiolatus* has not been collected at Woods Hole, although it seems to be more common in floating sargassum than *Endeis spinosa* is (fig. 7).

[6] Stephensen's (1933) record of *P. littorale* from Barbados is not supported by the collections examined; it may be a result of mislabeling.

Cole (*in* Sumner, Osburn, and Cole, 1913) suggested two other species as possible members of the Woods Hole fauna: *Nymphon grossipes* and *Pycnogonum littorale*. They are yet to be collected from that precise locality.

THE CARIBBEAN

Thirty-four species and 16 genera of pycnogonids have been identified from the Caribbean region, most of them from the vicinity of the Tortugas Marine Laboratory of the Carnegie Institution of Washington, and Key West, Fla. Several of them were originally described from such widely scattered localities as Norway, Naples, Cape Verde, and the Galápagos.

The characteristic element of this fauna is the genus *Anoplodactylus*. This genus is predominantly tropical and is as characteristic of warm-water regions as *Achelia* is of temperate latitudes and *Nymphon* is of the colder water of the higher latitudes. *Anoplodactylus* is represented in the West Indies by at least 13 species. Two of these, *Anoplodactylus lentus* and *A. insignis*, appear to be common, but the others are represented by one or two specimens or sporadic collections. The relatively large size and conspicuous coloration of these two species may account for this greater apparent abundance. *Anoplodactylus lentus* often has a spread of nearly 3 inches (7.5 cm.) and is of a deep purple color, and *A. insignis* is well over an inch in extent (2.5+ cm.), with prominent angular processes on the joints of the legs.

The species of *Anoplodactylus* from the Tortugas region are listed in table 2 (*A. carvalhoi* has been collected from the Virgin Islands but is not yet known from Tortugas).

The occurrence of *Anoplodactylus polignaci* off Sombrero Key, Fla., is of interest in connection with Bouvier's (1914a) opinion that its

TABLE 2.—*Species of* Anoplodactylus *from the Tortugas region*

Species	Number of collections from Tortugas and vicinity	Type locality	Distribution
lentus	3	Woods Hole, Mass.	South Carolina; Gulf of Mexico.
insignis	5	Bahia, Brazil	Bermuda; Cape Hatteras.
typhlops	1	Trondheim, Norway	Norway; off Iceland.
?maritimus	1	From sargassum, south of Azores.	
polignaci	1	Cape Verde	
evelinae	2	Santos, Brazil	
quadratispinosus	(1)	Key West, Fla.	
stylirostris	1	Tortugas, Fla.	
pectinus	2	do.	
sp. A	1	do.	
sp. B	(1)	Off Cape Canaveral, Fla.	[May be *massiliensis* from Mediterranean and North Africa.]

apparent relationship to *A. insignis* from Brazil was a point in favor of the theory of drifting continents, as he supposed the two species had become differentiated since the formation of the Atlantic Ocean.[7]

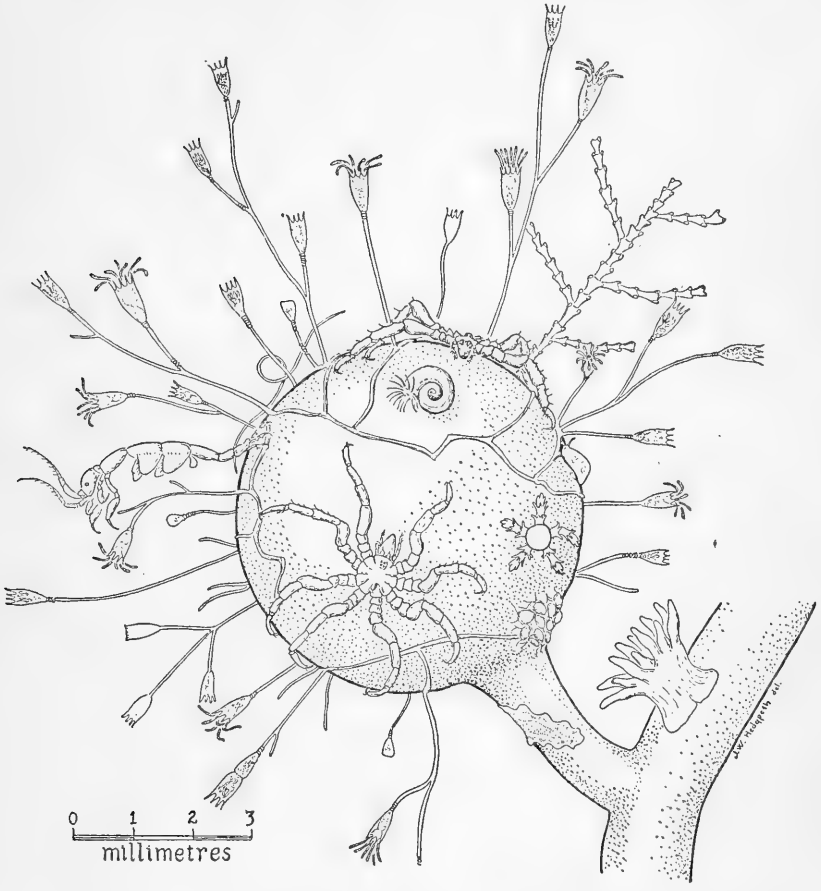

FIGURE 8.—The fauna of a sargassum bladder, including *Tanystylum orbiculare* Wilson.

As Marcus (1940b, p. 60) has remarked, the evidence that pycnogonids are in some instances subject to passive distribution makes such bold speculations unwarranted. Now that *A. polignaci* has been found on both sides of the Atlantic (together with several other species) Bouvier's theorizing is untenable. Furthermore, *A. polignaci* is apparently not so closely related to *A. insignis* as Bouvier supposed; while *A. insignis* is a very variable species, none of its variations indicate a close connection between the two species.

[7] For arguments against Wegener's theory of recent continental drift, see James Johnstone, "A Study of the Oceans," pp. 212–213, 1930, and R. W. Chaney, "Bearing of Forests on the Theory of Continental Drift," Sci. Monthly, Dec. 1940, pp. 489–499.

It is more reasonable to assume that such species have migrated as adults on the sargassum or as larvae in hydroids on the sargassum or in the medusa stage of the hydroid host.[8] Timmermann (1932), in his study of the fauna of the pelagic sargassum, discovered that two pycnogonids, *Endeis spinosa* and *Anoplodactylus petiolatus*, are apparently characteristic elements of this fauna, and Hodgson (1915) vaguely described another species, *Anoplodactylus maritimus*, from sargassum south of the Azores. Recently I have taken *Tanystylum orbiculare* from sargassum cast ashore on the Gulf coast of Texas. (Fig. 8.)

The fact that *Endeis spinosa* is common in the Tortugas region (it has also been found on the coast of South Carolina, in Chesapeake Bay, and at Bermuda) supports Timmermann's tentative suggestion that it might be an American species that owes its wide distribution along the coast of Europe to its pelagic habit. The apparent scarcity of *Anoplodactylus petiolatus* on the American side of the Atlantic would seem to contradict this explanation, especially since it is more common on the sargassum in mid-Atlantic than *Endeis spinosa*. However, it has been collected from sargassum on the Texas coast, while *Endeis spinosa* is yet to be collected from that part of the Gulf of Mexico. Nevertheless, *Endeis spinosa* is widely spread along the American Atlantic coast, from Brazil to Woods Hole, including the Panama region. It is possible that Giltay's *Anoplodactylus parvus* is the same species as *A. petiolatus*, in which case the American range of *A. petiolatus* would include Chesapeake Bay and Bermuda.

In addition to the two pycnogonids of known pelagic occurrence, at least eleven species are found on both sides of the Atlantic, exclusive of the Boreal-Arctic species, which have a more continuous distribution. Seven of these are found in the Tortugas-Key West region alone. It will be noted, from table 3, that two species, *Ammothella appendiculata* and *Endeis charybdaea*, have been found on the coast of southern Brazil but are not represented in the Tortugas collections. Their absence from the Florida Keys cannot be presumed from available evidence, and two species described from Brazil have been found in the area. It is probable that southern Brazil is the meeting place of the American tropical and the Magellanic faunas.[9]

The distribution of these species, several of them collected at the surface, appears to represent a dispersion from the rich Caribbean fauna rather than a concentration of widely scattered elements in that region. On the other hand, the Mediterranean fauna might be considered a concentration of European Boreal types and American Subtropical forms. The possibility that the Caribbean is a center of

[8] Larval stages of *Anoplodactylus petiolatus* have been found in medusae by Lebour (1916 and 1945).

[9] Only two isolated collections from the equatorial coast of eastern South America have been recorded in the literature: *Pentapycnon geayi* Bouvier (French Guiana) and *Nymphopsis anarthra* Loman (Venezuela).

dispersal for these forms gains some confirmation from a comparison of the pycnogonids from both sides of the Isthmus of Panama. Fourteen of the 20 genera known from the two regions (Cape Hatteras to about latitude 10° N. on the Atlantic side, Point Concepción to the Galápagos on the Pacific side) are represented in both faunal provinces. Three species occur in both regions (the records for two of them antedate completion of the Panama Canal):

Nymphopsis duodorsospinosa	Tortugas and South Carolina; Galápagos and Baja California.
Tanystylum calicirostre	Bermuda; Gulf of Panama.
Pycnogonum reticulatum	Tortugas and Key West; El Salvador.

There are also at least five pairs of closely related species, which may have become differentiated after the rising of the Isthmus:

Caribbean region	Panamic region
Callipallene	
*emaciata** (Tortugas)	*californiensis* (southern California)
Ammothella	
rugulosa (Brazil, Bermuda, Tortugas)	*heterosetosa* (Galápagos)
Ascorhynchus	
*armatus**† (Hatteras to Cuba)	*agassizi*† (Gulf of California)
Eurycyde	
raphiaster (Tortugas)*	*longisetosa* (Colombia)
Tanystylum	
*orbiculare**? (Brazil, Florida, Texas)	*duospinum* (central California)

†Deep-water species, possibly synonymous.
*Also from east side of Atlantic.

An interesting anomaly is the occurrence of species of *Anoplodactylus* with styliform probosces at Tortugas and the Hawaiian Islands. Although they are apparently not the same species, *A. stylirostris*, new species (Tortugas), and *A. intermedius* Hilton are evidently closely related.

WEST AFRICAN PYCNOGONIDS

Unfortunately our knowledge of the west African pycnogonids is incomplete, and future collections from that region may convince another investigator that such species as *Anoplodactylus polignaci* and *Eurycyde raphiaster* owe their distribution to the influence of the westward-flowing North Equatorial Current rather than to the Gulf Stream. The richness of the Caribbean fauna indicates that it is a more favorable region for the development of species (as does the

TABLE 3.—*Pycnogonids occurring on both sides of the Atlantic*

Species	Tortugas-Key West records	Other Western Atlantic	Eastern Atlantic
Anoplodactylus petiolatus		Hatteras, Texas, Southern Brazil, Sargasso Sea.*	Europe, from lat. 69° N. to Mediterranean, Plymouth*.
pygmaeus		Virginia, Texas	Ireland, England, Mediterranean.
typhlops	1		Norway, Ireland.*
(?*maritimus*		Off Habana	South of Azores.*)
polignaci	1		Cape Verde.
Halosoma robustum	1	Southern Brazil	Mediterranean.
Callipallene brevirostris		Woods Hole*, Chesapeake Bay.	European coast, France.*
phantoma	1*		Norway to Naples, Azores.
emaciata	2*		France, Mediterranean.
Pigrogromitus timsanus		Lake Worth, Fla	Suez Canal.
Ammothella appendiculata		Southern Brazil	Naples.
Eurycyde raphiaster	2	Bahamas, Dominican Republic, Colombia.	Cape Verde.
Endeis spinosa	10 (2*)	Brazil, Bermuda, Panama, Florida to Woods Hole, Sargasso Sea.*	Norway to Mediterranean, Black Sea, Azores.
charybdaea		Southern Brazil	Naples.

*Pelagic or tow-net records.

occurrence of two decapodous forms in the region) than the narrow, current-swept coast of west Africa. Another objection to this alternate explanation, on the basis of the present known distribution, is the absence of the European *Nymphon gracile* from the West Indies. This species has been taken at the surface in considerable numbers at Banyuls-sur-Mer (Fage, 1932), but it does not appear to be related to *Nymphon floridanum*, which has been collected at Tortugas in surface tows.

PYCNOGONIDS FOUND ON OR NEAR THE WEST COAST OF AFRICA

Nymphon gracile Leach
gruveli Bouvier
longituberculatus Olsen
cognatum Loman
adami Giltay
mauritanicum Fage
prolatum Fage
Anoplodactylus massiliensis Bouvier
polignaci Bouvier
Endeis spinosa (Montagu)
charybdaea (Dohrn) var. *bispinata* Bouvier
Achelia echinata Hodge
longipes Hodge
langi (Dohrn)
armata Bouvier
Ascorhynchus arenicola (Dohrn)
armatus (Wilson)
similis Fage
Eurycyde raphiaster Loman
Clotenia conirostris (Dohrn)
Colossendeis angusta Sars
colossea Wilson
macerrima Wilson
michaelsarsi Olsen
Pycnogonum littorale (Ström)
nodulosum Dohrn

Thanks to the investigations of the *Vanneau* along the coast of Morocco, the recently published papers on the collections of the *Talisman* (Bouvier, 1937), and *Président Théodore-Tissier* (Fage, 1942), and to other records, 24 or 25 species of pycnogonids have been identified from the west coast of Africa north of the Equator. Olsen's description of *Nymphon longituberculatus* in the *Michael Sars* Report (1913) seems to have been overlooked by other workers. *Nymphon cognatum* Loman (1928b) is very similar to Olsen's species and may be the same. The deep-water species included in the list above were all taken between the coast of Africa and the Canaries or the Azores.

BERMUDA

The collections from Bermuda are not altogether satisfactory, yet there is reason to believe that the littoral pycnogonids of that island are well represented in the collections. Both Verrill and Cole, who were especially interested in the sea spiders, collected extensively at Bermuda. With the exception of material that may be buried in the collections of the New York Zoological Society, I have seen all the museum material from Bermuda and have been advised by Dr. Isabella Gordon that the British Museum has no collections of pycnogonids from the island. The known species from Bermuda are:

Anoplodactylus insignis
Anoplodactylus parvus
Achelia gracilis
Ammothella rugulosa
Tanystylum calicirostre
Endeis spinosa

As might be expected, most of these species are found on the coast of the United States or in the Caribbean. *Tanystylum calicirostre*, however, is yet to be found in the Caribbean, although its occurrence in Bermuda and the Gulf of Panama suggests its presence there. There appears to be no endemic species in Bermuda. Although Giltay's (1934b) record of *Achelia gracilis* from the Bahamas is not supported by the collections examined, the species is found on the Florida coast. The absence of *Anoplodactylus petiolatus* is curious in view of its wide distribution on the sargassum, but it is possible that Giltay's *A. parvus* is a form of that species. In any event, the species is rare in Bermuda, or else it has been overlooked. In view of the distribution of various small species on both sides of the Atlantic, it is strange that more of them have not been found at Bermuda.

An additional species, *Calypsopycnon georgiae*, may be from Bermuda. It is known only from an unlabeled slide mount found in the collections of A. E. Verrill, which he may have collected on one of his trips to Bermuda, although it is equally possible that it may have been taken from an *Albatross* dredge collection.

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THE ATLANTIC AND PACIFIC COASTS

Although there are several similarities between the pycnogonids of the Caribbean and Panamic regions, the species found on the temperate continental shores of the opposite coasts of North America have little in common. The west coast, with its characteristic bold cliffs and outlying reefs, accompanied by the upwelling of cold water from offshore deeps, has limited the distribution of littoral species, with the result that a large number of closely related species have been developed. On the east coast the predominant geographical features are the long reaches of sandy beaches and outlying shoals, washed by the warm, northward-flowing Gulf Stream. These conditions are correlated with a sparse fauna of widely distributed species south of Cape Cod and north of Florida.

There are some comparable geographical features on the two coasts. These are the Bay of Fundy and Puget Sound, both deeply indented regions with Boreal-Arctic elements in their faunas, and Cape Hatteras and Point Concepción, which are the northern limits of many Tropical species of marine invertebrates on their respective coasts.

The similarities between the pycnogonids of the Bay of Fundy and Puget Sound are best understood from the following tabulation:

Bay of Fundy		Puget Sound
	Nymphon	
grossipes		*grossipes*
longitarse		*pixellae**
strömi		
	Phoxichilidium	
femoratum		*femoratum*
	Achelia	
spinosa		*alaskensis*
scabra		*harrietae*†
		longicaudata‡
	Pseudopallene	
circularis		**
	Pycnogonum	
littorale		*stearnsi*

*Closely related to *N. longitarse*, which is reported from Alaskan and Japanese waters.
†New name for *discoidea* Exline (Marcus, 1940b, p. 129)
‡ Unidentifiable species, possibly *A. latifrons* or *alaskensis*.
**A closely related species, possibly the same, is reported from Alaskan waters, and may also occur in Puget Sound (*Pseudopallene setosa* Hilton, 1942c).

Along the coast of California there are several localities from which at least twice as many species are known as are included in the perma-

nent fauna of Woods Hole. At Dillon Beach (about 40 miles north of San Francisco), for example, 9 species have been collected. About 21 species have been described from the central California coast, 14 of which have been collected in the vicinity of Pacific Grove.[10] Of particular interest is the large number of species of *Achelia* and *Tanystylum* on the California coast.

The occurrence of so many endemic species on the California coast, together with the physical conditions (upwelling of cold water and bold headlands) that limit their distribution, brings to mind the suggestion of Marcus (1940a, p. 197) that the limited locomotive powers of the Pycnogonida as a group have influenced the development of a large number of closely related species. The wider distribution of many species in the Atlantic, apparently associated with the Gulf Stream and floating sargassum, is not duplicated elsewhere and supports rather than disproves this hypothesis.

A few characteristic North Pacific species are found along the west coast as far south as the vicinity of San Pedro: *Pycnogonum stearnsi*, *Phoxichilidium femoratum*, and *Lecythorhynchus marginatus*. The Boreal *Nymphon grossipes* has not been collected south of Puget Sound.

In brief, the pycnogonids of the east coast south of Woods Hole are southern species that have worked their way northward, whereas the California coastal fauna is a mixture of endemic species, northern forms, and such southern species as *Anoplodactylus erectus*, *Tanystylum intermedium* (both found as far north as Pacific Grove), *Nymphopsis spinosissima*, and *Pycnogonum rickettsi* (northernmost records, Dillon Beach).

Although at least three species of pycnogonids have been taken in tow nets in the Japanese region (Ohshima, 1933), few northwestern Pacific species are found on the American coast. The anomalous and puzzling distribution of *Ammothella bi-unguiculata* (Naples, southern California, Hawaii, and Japan) is the most conspicuous example. The distribution of the genus *Lecythorhynchus* (Ammotheidae) may be of more zoogeographical significance. One species, *L. hilgendorfi*, is known from the western Pacific, and another, *marginatus*, is a character species of the California coast. Hilton (1942d) has described a third species of this genus, *L. ovatus*, from Hawaiian waters.

SYSTEMATIC DISCUSSION

The literature on the Pycnogonida is fantastically large and is scattered in dozens of bulletins, journals, and proceedings, many of them unavailable even in the largest libraries. Type material has fared no better; as Calman (1923, p. 267) sourly remarks, specimens

[10] For further information concerning California species see Hedgpeth (1941) and Hilton's numerous preliminary papers, listed in the bibliography.

are distributed in museums "as widely scattered as were the original habitats." I have tried to make this review as complete as possible so that students interested primarily in biological oceanography and invertebrates in general can use it without recourse to scattered papers. Drawings have been made of all the species examined, usually from unmounted material, with the aid of a camera lucida. Thus the element of perspective must be taken into consideration when studying the drawings, and extreme examples of foreshortening are indicated whenever they occur. The measurements of the larger specimens were made with a pair of dividers; for the smaller specimens the following system was used: A series of millimeter scales, enlarged with the camera lucida by various lens combinations, was prepared, and the object to be measured was projected by the lucida against the appropriate scale. Of the 70 species discussed in this paper, 9 are described as new (3 of these have been indicated by preliminary diagnoses in an earlier paper, 1943b), and 2 referred to their genus.

No attempt has been made to include complete synonymies of well-known species, but all important local references, insofar as I have been able to find them, have been included.

Unless otherwise indicated, the material listed is in the United States National Museum. Material from other museums is referred to by the following abbreviations: the Museum of Comparative Zoology at Harvard, M. C. Z.; the Peabody Museum of Natural History at Yale, Y. P. M.; the American Museum of Natural History, New York City, A. M. N. H. This system has not been used for the *Albatross* collections, individual lots of which are about evenly divided between the National Museum and the Peabody Museum. The number of specimens listed from each *Albatross* station has been compiled from the collections now in these two museums and does not represent the original collection in many instances, since no complete records have been kept of specimens sent to European museums from time to time. The more complete set, including specimens of all the species mentioned, is in the National Museum.

The taxonomy of the larger genera (e. g., *Nymphon*, *Colossendeis*, *Achelia*, *Anoplodactylus*) is in a sad state of disrepair, but revision of their species must await that unrealized millennium when existing types and scattered collections are available to one specialist for redescription and comparison. Collections from European and Arctic regions have been accumulating for more than a hundred years, and the inadequate descriptions of earlier workers have resulted in an almost hopeless tangle, which academic taxonomists have done little to unravel.

The most outstanding recent taxonomic papers on the Pycnogonida are Gordon's *Discovery* Report (1932), with its fine review of the

Antarctic species, and Marcus's (1940b) excellent catalog of the Brazilian and South American pycnogonids. Bronn's Tierreich monograph by Helfer and Schlottke (1935) is the first general account of the class as a whole, but it is marred by minor errors in the bibliography and the haphazard treatment of several generic names. Of the older monographs, those by Dohrn (1881) on Mediterranean species and Sars (1891) on the Norwegian species are classics and indispensable references. Both are beautifully illustrated.

The determined reader who ventures into the following pages in search of further enlightenment will do well if he survives with any vestige of the patience that has served him this far. Why are species in some genera separated by characters ignored in other genera, why this dwelling on the lengths of claws, or this petty quibbling over names themselves? He will soon suspect that "species" are subjective appraisals, that the conception of what constitutes a species varies with the one who specifies. In the words of the late Dr. Tate Regan, "A species is a community, or a number of related communities, whose distinctive morphological characters are, in the opinion of a competent systematists, sufficiently definite to entitle it, or them, to a specific name." As Julian Huxley observes, in commenting on this definition, the difficulty is in the word "competent." "And experience," he continues, "teaches us that even competent systematists do not always agree as to the delimitation of species."[11]

This, of course, is another way of suggesting that a species is perhaps an anthropomorphic conception rather than a natural entity. As Darwin said, "No one definition has satisfied all naturalists, yet every naturalist knows vaguely what he means when he speaks of a species." It does not seem, however, that a species is as artificial as it appears to be in taxonomic papers—the fault is not in our species but in ourselves—and I cannot agree with the famous remarks in the conclusion of the "Origin of Species": "We shall have to treat species in the same manner as those naturalists treat genera, who admit that genera are merely artificial combinations made for convenience. This may not be a cheering prospect; but we shall at least be freed from the vain search for the undiscovered and undiscoverable essence of the term species." Darwin was an optimist; we are more deeply engrossed in that vain search than ever, standing, in the words of Henry Adams, on the shore of a sunless sea, "diving for pearls and never finding them."[12]

That the taxonomist is a practitioner of a branch of metaphysics has been suspected by some writers, although few have explicitly

[11] Julian Huxley, "Evolution: The Modern Synthesis," p. 157, 1943.

[12] Leon J. Cole, who began as a pycnogonid student and is now a geneticist, has presented an interesting discussion of these matters in his article "Each after his Own Kind," Science, vol. 93, pp. 289–293, 316–319, 1941.

stated as much. Unfortunately, the philosophical basis of taxonomic procedure has not been adequately examined. The only discussion of taxonomy as a branch of philosophy with which I am familiar is that by J. S. L. Gilmour in "The New Systematics." [13] At best this is inconclusive—first we must have an "epistemological theory of how scientists obtain knowledge of the external world" before principles underlying the process of classification can be examined. As philosophy is already a graveyard of outworn epistemological theories, this is hardly encouraging.

Whatever taxonomists may decide a species to be, it appears to the philosopher as a dynamic expression of force, a conception which, if accompanied by a denial of teleology, leaves us peering ironically into the abyss of ignorance in company with the frustrated Mr. Adams, still in search of an education, that endless quest for the answer to the problem of unity and multiplicity. Perhaps a mere museum taxonomist, working over specimens that come from regions he has never visited and that have been preserved in basements for 60 years, has no business diving for pearls or tripping the light fantastic on the edge of his own abyss of ignorance. Yet all is grist for the mills of knowledge and philosophy, and no one can say that a particular oyster does not contain a pearl until he opens it.[14]

There seem to be a few meager seed pearls in the thorny oyster of pycnogonid systematics. The suggestion that a species is a dynamic expression of biological force, and that genera are abstractions representing historical events, "dynamic unities in the past," enables one to contemplate the large genera, the bizarre species *sui generis*, and the 10-legged forms with some sense of coherence or form.[15] Considering a genus as a historical idea, we can regard the genus *Nymphon* as the result of a singularly well adapted dynamic unit, which has expanded in many directions—to more than 90 taxonomic species, in fact. Continuing this line of reasoning, the monospecific genera in such families as the Ammotheidae and Tanystylidae are really species with a low dynamic potential—only when a species becomes so differentiated that it is more than one, when it has begun to display multiplicity in its unity, so to speak, can it be called a member of a genus. By rising to generic rank an original species has become "extinct" and has been replaced by its descendants but has gained in dynamic force. Ten-legged forms, labeled genera for convenience, must be further

[13] Taxonomy and Philosophy, in "The New Systematics," pp. 461–474. Edited by Julian Huxley, Oxford, 1940.

[14] Thoreau, somewhere, describes the pearl as "a hardened tear of a diseased clam, murdered in its old age." Pearls of wisdom secured by injudicious diving into the absolute may have the same dubious antecedents.

[15] This conception is discussed at length by Hugh Miller, in "History and Science: A Study of the Relation of Historical and Theoretical Knowledge," 201 pp., Berkeley, 1939. "Our purpose is to free empirical science from the ghosts of the rationalistic past that still haunt and mislead its progress." Nevertheless, the ghosts of teleology and purpose still haunt me.

expressions of the dynamics behind the 8-legged species they resemble. It cannot be an accident of a mechanistic universe that these 10-legged forms occur in groups whose success is already indicated by their large contingents of closely related "normal" species.

Why, then, have I retained artificial species, genera, and families, insisting on keeping the Tanystylidae separate from the Ammotheidae, and indulging in other inconsistencies? The principal reason, aside from the perennial problem of simplifying classification for reference purposes after the manner of a library catalog system, is the recognition of divergence within the group. The Pycnogonida is a young group, albeit an apparently useless one by anyone's teleology or economic interests, and if the dynamic force that is expressing itself in this particular group of organisms continues, the lines of divergence, now conceived as arbitrary, may become broader in time and be rec ognized as "natural" divisions by the taxonomists of a subsequent millennium.

In the meanwhile, we must proceed with our subjective appraisals of species. I regret the necessity for describing species on the basis of single specimens, for giving the same name to groups that are alike, but yet not quite the same, e. g., the Brazilian and North Atlantic forms of *Tanystylum orbiculare* and the northern and southern forms of *Nymphon macrum*, and other vagaries of my human imperfection, splitting or lumping as seems best at the moment. But if we made it a hard and fast rule not to describe a species from a single specimen, we would have to wait some time for information concerning the extent of divergence and variation within the group. Some of these creatures dredged from the bottom of the sea may never be found again, and statistical or comparative methods require, for perfection, more material than is available even in some of the largest series before me. And even an amateur does not have all the time he would like to have to devote to his studies. Eventually the taxonomists of the great museums will devise methods for such organisms as the pycnogonids, involving perhaps the use of extensive series of superimposed camera-lucida drawings or photographs, which will clarify the status of species in such aggregates as *Nymphon*. Until that happy day, the present methods, as applied in the following pages, will have to do.[16]

Family NYMPHONIDAE Wilson, 1878

Ovigers 10-jointed, in both sexes. Chelifores chelate, 2-jointed; palpi 5-jointed. With one decapodous genus.

In agreement with other writers, particularly Calman (1915a) and

[16] Some possible ways of dealing with the taxonomic problems reviewed above are discussed by Isaac Ginsburg, in "Divergence and Probability in Taxonomy." Zoologica, vol. 25, No. 1, pp. 15–31, 1940. Other references will be found in his paper. This discussion was written before I had read Mayr's "Systematics and the Origin of Species."

Gordon (1932), *Chaetonymphon* Sars, 1891, is reunited with *Nymphon* J. C. Fabricius, 1794. The three species occurring in the western North Atlantic, which have been previously referred to *Chaetonymphon*, form a natural group and are considered under group A of the genus as a matter of convenience (fig. 9).

The former inclusion of *Paranymphon* Caullery in the Nymphonidae is not so much an indication of its natural relationships as it is of the artificial nature of the families in the Pycnogonida. It differs from all the Nymphons in having an unsegmented body and blunt 7-jointed palpi. In its assemblage of anomalies it resembles *Ainigma* Helfer (1938).

Ainigma ornatum is a small, delicate form from the Agulhas Bank off South Africa, having very high dorsal tubercles at the ends of the lateral processes, tapered tarsal joints without auxiliary claws, and an oviger with a few large denticulate spines and a simple large terminal spine. These characters it shares with *Paranymphon spinosum*, but the segmented trunk, large proboscis, 2-jointed chelifores (the chelae are mere knobs), and 9-jointed palpi of *Ainigma* entitle it to a place in the Ammotheidae. The genital protuberances are on the femurs instead of the second coxae. One is inclined to wonder whether these two queer genera are not more closely related to each other than they are to the families in which they have been included. Therefore I have removed *Paranymphon* from the Nymphonidae and placed it in the Ammotheidae.

Four genera are included in the Nymphonidae, one of which (*Boreonymphon*) is monospecific. *Pentanymphon* and *Heteronymphon* are represented by two species each. Following is a key to the genera of the Nymphonidae:

1. Four pairs of legs 2
   Five pairs of legs (Antarctic) ..... **Pentanymphon** Hodgson
2. Fingers of chelae denticulate, eye tubercle usually present 3
   Fingers of chelae not denticulate, strongly bowed and with opposed tips; eye tubercle reduced to a minute pimple (Arctic) ..... **Boreonymphon** G. O. Sars
3. Eye tubercle at base of neck between first pair of lateral processes; oviger with terminal claw ..... **Nymphon** (p. 180)
   Eye tubercle forward, near base of chelifores; oviger without terminal claw (Antarctic) ..... **Heteronymphon** Gordon

Genus NYMPHON J. C. Fabricius, 1794

(including *Chaetonymphon* G. O. Sars, 1891)

Chelifores 2-jointed, chelate, chelae well developed. Palpi 5-jointed. Ovigers present in both sexes, 10-jointed, terminal joints with denticulate spines and a terminal claw on the last joint. Body segmented, usually elongate but never tightly compact. Propodus without heel but usually with auxiliary claws.

The taxonomy of the Boreal-Arctic and Tropical species of *Nymphon* is in such a chaotic state that it is with some hesitation that I propose two new species for the genus. Ninety or a hundred species have been assigned to this unwieldy genus, yet there seems to be no end to the variations of trivial characters on which the species are based. Although *Nymphon* attains it maximum development of species and numbers of individuals in the Arctic and Antarctic regions, species are by no means rare in tropical regions, and, as Giltay (1937, p. 87) remarked, more will probably be found by future collectors.

Ten species of *Nymphon* have been identified from the regions considered in this report, and three more occur within the northern limits of the area. As they are usually Arctic species, they have been included in the key in brackets in order to keep the key as simple as possible. The species south of Newfoundland fall into two groups: A, *spinosissimum*, *hirtipes*, and *tenellum*, which have a heavily setose trunk and legs and rather short tarsal joints in proportion to the propodus; and B, *grossipes*, *longitarse*, *strömi*, *rubrum*, *macrum*, *giltayi*, and *floridanum*, which are characterized by the lack of closely set setae on the trunk and legs, and, except for *floridanum*, by relatively long tarsal joints.

The collection of *Nymphon sluiteri* Hoek from the Gulf of St. Lawrence in 1932 indicates that this species may be a rare member of the New England–Newfoundland fauna, although this is the extreme southern record for this species. Another Arctic species, common on the coast of Greenland and in Fox Basin, *Nymphon brevitarse* Krøyer, occurs as far south as the Strait of Belle Isle but so far is unknown from the southern part of Newfoundland. A third Arctic species, *Nymphon elegans* Hansen, was taken by the *Godthaab* at station 14, latitude 55° N., longitude 56°34′ W. (off Labrador), and may be expected at moderate depths off Newfoundland.

KEY TO WESTERN ATLANTIC NYMPHONS SOUTH OF NEWFOUNDLAND

1. Tarsus half as long or less than half as long as propodus 2
   Tarsus almost as long as or longer than the propodus 5
2. Lateral processes separated by their own width or less; legs and trunk setose .. 3
   Lateral processes separated by more than their own width; legs and body not thickly setose ..... **floridanum**, new species (p. 196)
3. Lateral processes separated by less than half their own width; neck about as long as wide 4
   Lateral processes separated by more than half their own width; neck slightly longer than wide ..... **tenellum** (p. 185)
4. Auxiliary claws at least half as long as terminal claw ..... **spinosissimum** (p. 183)
   Auxiliary claws about one-fourth as long as terminal claw ..... **hirtipes** (p. 183)
5. Fingers of chelae comparatively thick, shorter than palm, a few large spines on sole of propodus 6
   Fingers of chelae slender, usually long or longer than palm; without large spines on sole of propodus 7

6. Small (less than 2.5 cm. in extent); large spines on propodus as long as diameter of joint, widely spaced, on proximal half ..... **rubrum** (p. 192)

[Neck about as long as proboscis (shorter in *N. rubrum*); joints of palpi rather thick in proportion to their lengths; coxae without the prominent lateral spines of *N. rubrum*; spines on propodus about half as long as diameter of joint (Strait of Belle Isle, northward) ..... *brevitarse* Krøyer]

Medium sized (3 cm. or larger); spines on propodus not so long as diameter of joint ..... **grossipes** (p. 187)

7. Auxiliary claws less than one-fourth as long as terminal claw 8

Auxiliary claws one-half to two-thirds as long as terminal claw 9

8. Neck short; chelae with more than 25 large spinules on each finger, tips pointed ..... **strömi** (p. 190)

[Neck moderately long; fingers of chelae curved sharply at tips, dactylus blunt or spatulate at tip; auxiliary claws more than one-fourth but less than half as long as terminal claw ..... *elegans* Hansen]

Neck long, slender; chelae with 25 or less small spinules on each finger; tarsus twice as long as propodus ..... **longitarse** (p. 190)

[Tarsus slightly longer than but not twice as long as propodus; terminal claw about as long as propodus, auxiliary claws minute (Gulf of St. Lawrence) ..... *stuiteri* Hoek]

9. Eye tubercle low, without eyes; fingers of chelae not conspicuously longer than palm, with less than 25 spinules on either finger ..... **giltayi**, new species (p. 195)

Eye tubercle prominent, eyes present; fingers of chelae longer than palm, with more than 50 spinules ..... **macrum** (p. 193)

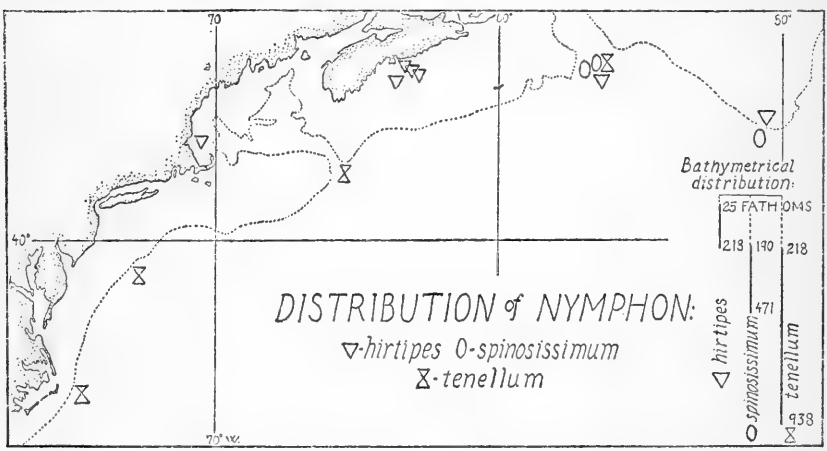

FIGURE 9.—Distribution of group A Nymphons.

GROUP A

Although the three species in this group resemble one another so closely that they have often been confused, their distribution is different. *Nymphon tenellum* is about half the size of the other species and its appendages are more slender in proportion to their lengths. *Nymphon spinosissimum* and *hirtipes* are thickset-looking animals. As can be seen from the accompanying map (fig. 9), the only locality from which all three species of this group have been collected is the trough between Newfoundland and Nova Scotia, which marks the submarine extension of Cabot Strait.

The occurrence of *Nymphon tenellum* off Cape Hatteras in 938 fathoms is the deepest record for any *Nymphon* in American waters.

NYMPHON SPINOSISSIMUM (Norman)

FIGURES 10, *a*; 11, *a*

Chaetonymphon spinosum SARS (*nec* Goodsir), 1891, pp. 107–109, pl. 11, fig. 3, *a–i*.
Chaetonymphon spinosissimum NORMAN, 1894, p. 154; 1908, pp. 219–220.
Chaetonymphon spinosum SCHIMKEWITSCH (part), 1930, pp. 335–336.
Chaetonymphon spinosissimum STEPHENSEN, 1933, pp. 6–8, fig. 2 (map); 1943, pp. 14–15, fig. 4 (map).

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2429	June 23, 1885	42 55 30	50 51 00	471	+25
2471	July 4, 1885	44 34 00	56 41 45	218	+10
2484	July 5, 1885	44 20 00	57 11 15	204	1♂, ov.
2486	do	44 26 00	57 11 15	190	2

This species is easily confused with *Nymphon hirtipes*, which it resembles in most particulars except the greater length of its auxiliary claws and usually heavier setae. Though there are specimens of *hirtipes* that are as setose as the usual *spinosissimum*, the latter species never has the bald appearance found in many specimens of *hirtipes*. *N. spinosissimum* is about 5 cm. in extent. Ovigerous males were taken in June and July from American waters.

Distribution.—A Boreal species, preferring deeper water than *Nymphon hirtipes*. Stephensen reports it from western Greenland and Davis Strait. Also from Norway and the Faroes, but not the British Isles.

NYMPHON HIRTIPES Bell

FIGURES 10, *b;* 11, *b*

Nymphon hirtipes BELL, 1853, p. 403, pl. 35, fig. 3.—WILSON, 1878b, pp. 22–23, pl. 5, figs. 2–3, pl. 6, fig. 2, *a–k*.
Nymphon hirtum WILSON, 1880, pp. 495–497, pl. 7, figs. 38–41.
Chaetonymphon hirtipes SARS, 1891, pp. 103–107, pl. 11, figs. 2, *a–k*.
Nymphon hirtum WHITEAVES, 1901, p. 264.
Chaetonymphon hirtipes STEPHENSEN, 1933, pp. 8–9, figs. 2, 10 (maps).—NEEDLER, 1943, pp. 11–12, fig. 14, *a–e*.—STEPHENSEN, 1943, pp. 9–14, figs. 2, 3 (maps).

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2430	June 23, 1885	42 58 30	50 50 00	179	1 (ov. ♂)
2471	July 4, 1885	44 34 00	56 41 45	218	2
2508	July 8, 1885	44 28 30	62 56 00	72	1

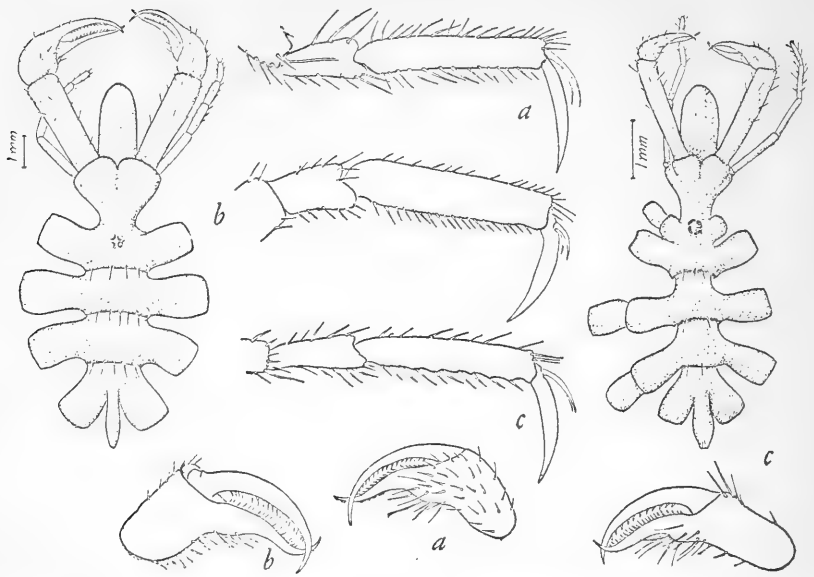

FIGURE 10.—*a*, *Nymphon spinosissimum* (Norman); *b*, *Nymphon hirtipes* Bell; *c*, *Nymphon tenellum* Sars.

This species, characterized by its short auxiliary claws, has been taken in past years in large numbers off Halifax. It is slightly larger than *N. spinosissimum*. In many specimens the setae are so fine that the animal is apparently bald.

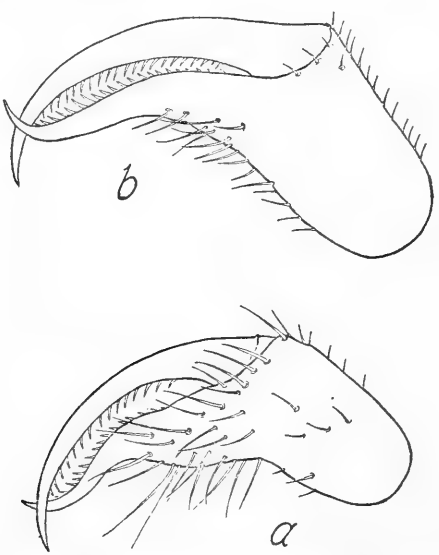

FIGURE 11.—*a*, Chela of *Nymphon spinosissimum; b*, of *Nymphon hirtipes*.

Distribution.—Nymphon hirtipes has a more Arctic distribution than *N. spinosissimum;* it is common off northwestern Greenland and Baffin Land. It is also found in the Barents and Kara Seas. Stephensen (1933) suggests that it may live on the coral *Eunephthya* and presents a map showing the coincidence of these organisms with *N. hirtipes* off western Greenland. In the New England region it has been collected as far south as Massachusetts Bay. Stephensen (1943) has a map showing the Arctic distribution of this species (fig. 3) and another (fig. 4) of its occurrence around Greenland.

NYMPHON TENELLUM (Sars)

FIGURE 10, *c*

Chaetonymphon tenellum SARS, 1888, p. 353; 1891, pp. 109–111, pl. 12, fig. 1, *a-h.*
Nymphon pallenoides WILSON, 1881, p. 254, pl. 3, fig. 14.—VERRILL, 1885, p. 561.
Nec *Chaetonymphon tenellum* MEINERT, 1899, p. 45.
Chaetonymphon tenellum STEPHENSEN, 1933, pp. 8–10.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2072	Sept. 2, 1883	41 53 00	63 35 00	858	1
2111	Nov. 11, 1883	35 09 50	74 57 40	938	1
2471	July 4, 1885	44 34 00	56 41 45	218	2
2528	July 13, 1885	41 47 00	65 37 30	677	10

The description accompanying Wilson's tentative identification of a specimen from *Blake* station 338 as *Nymphon pallenoides* Sars does not altogether agree with his figure of the tarsal joints. The tarsus is considerably longer than the same joint in *N. hirtipes*, but the long auxiliary claws are similar to those of *N. spinosissimum.* It is more slender in general appearance than either *hirtipes* or *spinosissimum* and is smaller, about 3.5 cm. in extent. It is evident that Wilson's specimen was *N. tenellum*, since Sars's *N. pallenoides* was later synonymized by him under *N. hirtum* (Sars, 1891).

Distribution.—Nymphon tenellum is not a common species. According to Stephensen, Meinert's records from west of Greenland are misidentifications. It appears to be a North Atlantic deep-water species.

GROUP B

Four species in this group are characteristic members of the invertebrate fauna of the New England region. Of particular interest are the southward extensions in range for *Nymphon strömi* and *N. macrum* (fig. 12). In addition to the localities indicated on the map, two specimens of *Nymphon* from south of Florida have been referred to *macrum*, although the tarsal joints and claws are heavier than in typical New England material.

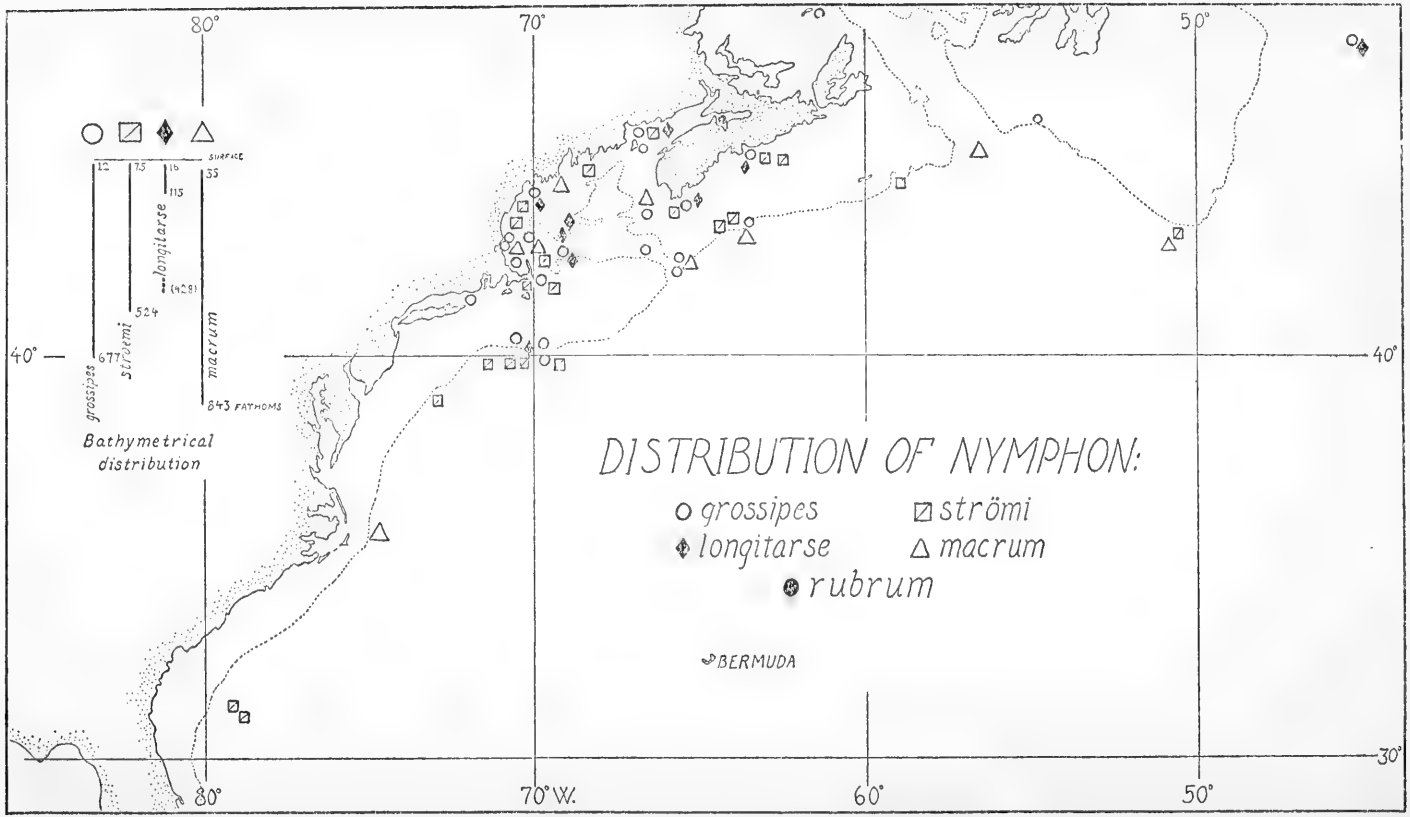

FIGURE 12.—Distribution of Group B Nymphons in the western North Atlantic.

NYMPHON GROSSIPES (O. Fabricius?) Krøyer

FIGURE 13, *a*

Nymphon grossipes FABRICIUS, 1780, p. 41.—STIMPSON, 1853, p. 38.—VERRILL, 1874b, p. 411; 1874c, p. 502.—WILSON, 1878b, pp. 20–22, pl. 17, fig. 1, *a-q*; 1880, pp. 491-494, pl. 6, figs. 32–37, pl. 7, fig. 42; 1881, p. 253.—VERRILL, 1885, p. 561.
Nymphon glaciale SARS, 1891, pp. 63–65, pl. 6, fig. 1, *a-q*.
Nymphon grossipes SARS, 1891, pp. 65–68, pl. 6, fig. 2, *a-i*.
Nymphon mixtum SARS, 1891, pp. 68–71, pl. 6, fig. 3, *a-i*.
Nymphon grossipes WHITEAVES, 1901, p. 264.—SUMNER, OSBURN, and COLE, 1913, p. 677.—STEPHENSEN, 1933, pp. 11–12.
Nymphon mixtum OHSHIMA, 1936, p. 682.
Nymphon turritum EXLINE, 1936, pp. 416–418, fig. 33, *g*, *k*.
Nymphon glaciale GILTAY, 1942, p. 459.
Nymphon grossipes NEEDLER, 1943, pp. 5–7, fig. 5, *a-e*.—STEPHENSEN, 1943. pp. 18–20, fig. 6 (map).
Nymphon mixtum NEEDLER, 1943, p. 7, fig. 6, *a-e*.
Nymphon glaciale NEEDLER, 1943, p. 8, fig. 7, *a-e*.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2062	Aug. 31, 1883	42 17 00	66 37 15	150	
2260	Sept. 28, 1884	40 13 15	69 29 15	46	4
2521	July 12, 1885	42 30 30	65 02 00	65	1
2525	July 13, 1885	41 49 00	65 49 30	72	1
2694	Aug. 11, 1886	46 52 30	44 54 30	86	1
2696	do	46 53 30	46 05 30	98	1
2699	Aug. 22, 1886	45 04 00	55 23 00	72	4

GRAMPUS RECORDS

10013	July 24, 1912	43 16	70 20	----------	1
10019	July 29, 1912	43 30	69 48	45	1
10037	Aug. 21, 1912	44 17	68 05	22	5

ADDITIONAL RECORDS

St. Croix River, between biological station toward Joes Point, St. Andrews, New Brunswick, August 1913, R. W. Miner coll., 7 specimens (AMNH).

Opposite biological station, St. Andrews, New Brunswick, August 1913, R. W. Miner coll., 2 males (1 ov.) (AMNH).

Off Grand Harbor, Grand Manan, August 10, 1910, H. L. Clark and H. B. Bigelow colls., 1 specimen (MCZ).

This ubiquitous circumpolar species is the commonest representative of the genus in New England waters, as it is on the European side of the ocean. It is very variable, especially in the lengths of the tarsal joints and the neck. The shape of the chelae, together with the thick

appearance of the tarsal joints, characterizes this species. Ovigerous males have been collected in New England waters in July. The specimens vary from about 4 to 8 cm. in extent.

Needler, following Giltay, prefers to keep *Nymphon mixtum* [and *N. glaciale*] separate from *N. grossipes*, but Stephensen (1935), working with a large Norwegian series, was unable to separate the varieties. I have had no better success with the New England material at my disposal, consisting of several hundred specimens. As there seems to be no geographical or bathymetric correlation with the various proportions of the lengths of tarsal joints and differences in the palpal joints, at least in the New England region, I see no purpose in trying to maintain these forms, either as distinct species or varieties, although I have allowed the older indentifications to stand in the appendix tables at the end of this paper. Derjugin (1935, pp. 118–122) has an extended discussion in Russian of the *grossipes* complex, and elsewhere in his paper presents a formidable array of graphs and tables. According to his English summary on p. 140, "*Nymphon glaciale*, *N. rubrum* and *N. brevitarse* represent forms of the same species, to which we have left the denomination of *N. brevirostre* . . ." His reasons for using the name *brevirostre* are not explained in the summary, but it seems to me to be an unnecessary addition to the confusion. He goes on to state, in contradiction to his contention that "the species of *N. brevirostre* are easily distinguished from those of the related species," that "all the forms of *N. brevirostre* and *N. grossipes* are characterized by a pronounced variability of the age-character. The different stages of individual development of separate forms may be similar to each other." His concluding statement on this species complex, that "the forms of *N. brevirostre*, *N. grossipes* and *N. mixtum* bear the stamp of geographical and ecological varieties," may hold for the Russian Arctic but evidently breaks down in the Norwegian and New England regions. Until the genus *Nymphon* is revised by someone with access to specimens of all or most of the hundred and more species, and the limits of speciation within this genus are more clearly defined, there will inevitably be some difference of opinion on the status of the forms in the *grossipes* complex in particular.

Distribution.—*Nymphon grossipes* is found in shallow water from the Bay of Fundy to Long Island Sound and in deeper water at various depths to 677 fathoms from Flemish Cap to the southern edge of Georges Bank. It is also known from the Gulf of St. Lawrence, Davis Strait, and northwest Greenland. In European waters it is found from central England to the Arctic Circle and the White Sea. In the North Pacific it occurs as far south as Puget Sound and Japan (lat. 35°N.).

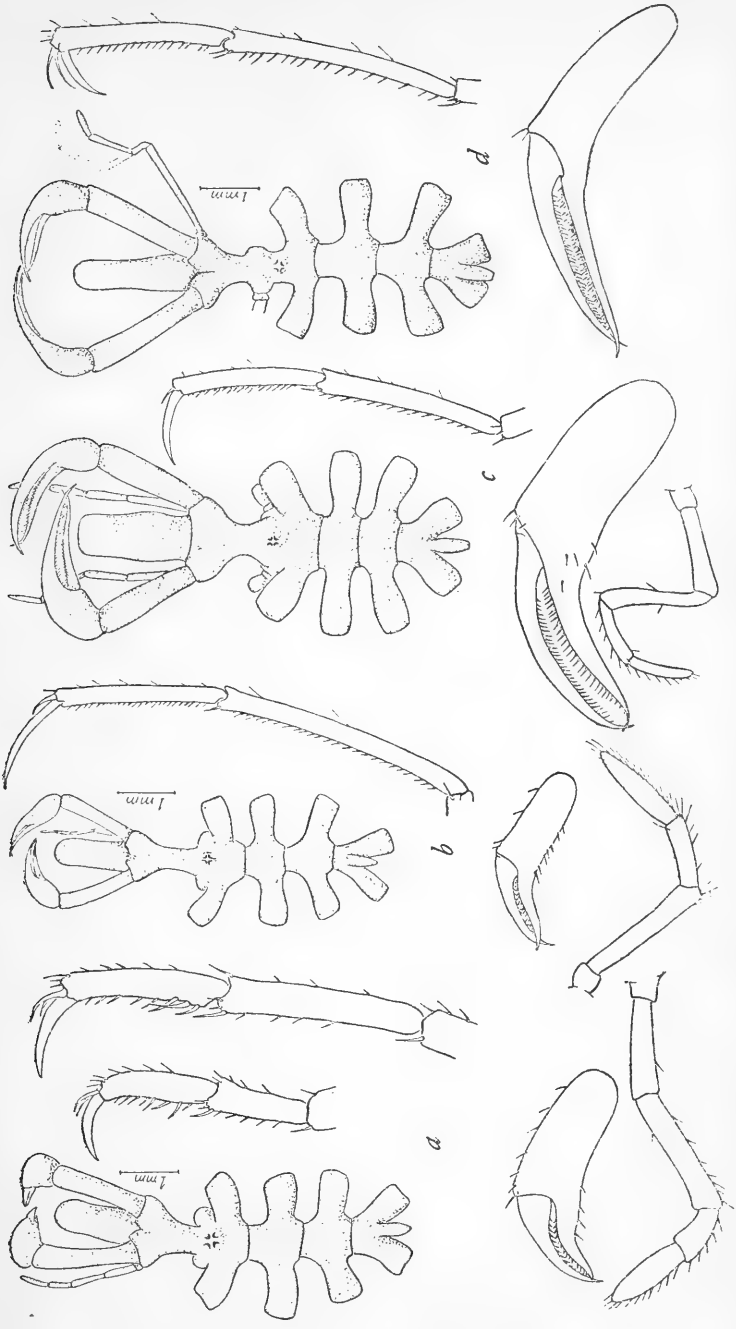

FIGURE 13.—*a*, *Nymphon grossipes* (Fabr.) Krøyer; *b*, *Nymphon longitarse* Krøyer; *c*, *Nymphon strömi* Krøyer; *d*, *Nymphon macrum* Wilson.

NYMPHON LONGITARSE Krøyer

FIGURE 13, *b*

Nymphon longitarse KRØYER, 1844, p. 112.—WILSON, 1878b, p. 19, pl. 7, fig. 2, *a-h*; 1880, pp. 489–491, pl. 6, fig. 30.—SARS, 1891, pp. 75–78, pl. 7, fig. 3, *a-h*.—WHITEAVES, 1901, p. 264.—NORMAN, 1908, pp. 212–213.—STEPHENSEN, 1933, pp. 13–14, fig. 3 (map).—LOSINA-LOSINSKY, 1933, pp. 67–68.—OHSHIMA, 1936, p. 862.—NEEDLER, 1943, p. 9, fig. 9, *a-e*.—STEPHENSEN, 1943, pp. 21–22.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2212	Aug. 22, 1884	39 59 30	70 30 45	428	1
2696	Aug. 11, 1886	46 53 30	46 05 30	98	1

GRAMPUS RECORD

10021	July 29, 1912	43 38 00	69 13 00	60	1

ADDITIONAL RECORD

Sluice at entrance to Kittys Cove and tide rip, St. Andrews, New Brunswick, 3–12 feet, August 25, 1913, R. W. Miner and H. Mueller colls., 1 female (fragments) (AMNH).

A relatively stable and uniform species, for this genus. It is the most delicate and clean limbed of the common New England Nymphons. Ovigerous males have been taken in October.

Distribution.—In the western Atlantic this species is restricted primarily to the Gulf of Maine, where its usual bathymetric range is 16 to 155 fathoms. Stephensen gives Cape Hatteras as the southern limit of its distribution. This appears to be derived from Norman's distribution table of North Atlantic pycnogonids, which consigned our local species to a category titled "N. E. America to 35°." The *Albatross* record from station 2212 is the only known occurrence south of Cape Cod, but it is considerably north of Cape Hatteras. *Nymphon longitarse* has been identified from the Sea of Japan and Peter the Great Bay (1600–1690 meters) by Losina-Losinsky, and from Japanese waters by Ohshima. Hilton (1942a) mentions the species from Alaskan waters. Evidently it is a circumpolar, low Arctic species.

NYMPHON STRÖMI Krøyer

FIGURE 13, *c*

Nymphon strömii KRØYER, 1844, p. 111.
Nymphon giganteum WHITEAVES, 1872, p. 349.—VERRILL, 1874b, p. 411.
Nymphon Strömii WILSON, 1878b, pp. 17–18, pl. 6, fig. 1, *a-h*; 1880, pp. 483–487, pl. 5, pl. 6, fig. 29; 1881, p. 253.—VERRILL, 1885, p. 561.

Nymphon Stroemii Whiteaves, 1901, p. 263.
Nymphon strömi Stephensen, 1933, pp. 16–17.
Nymphon stroemii Needler, 1943, p. 9, fig. 10, *a-d*.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2046	July 31, 1883	40 02 49	68 49 00	407	1
2062	Aug. 31, 1883	42 17 00	63 37 15	150	2 (1 ov. ♂)
2064	----do----	42 25 40	66 08 35	122	1
2246	Sept. 26, 1884	39 56 45	70 20 30	122	2
2415	Apr. 11, 1885	30 44 00	79 26 00	440	1
2429	June 23, 1885	42 55 30	50 51 00	471	+15 (incl. ov. ♂♂)
2508	July 8, 1885	44 28 30	62 56 00	72	1 (ov. ♂)
2517	July 12, 1885	43 10 00	64 18 00	55	4
2518	----do----	43 05 00	64 40 30	60	1
2522	----do----	42 20 00	65 07 30	104	2
2523	July 13, 1885	41 48 30	65 44 30	111	1
2666	May 5, 1886	30 47 30	79 49 00	270	2
2667	----do----	30 53 00	79 42 30	273	1
2669	----do----	31 09 00	79 33 30	352	1
2687	July 18, 1886	39 46 00	71 19 00	326	1
2698	Aug. 22, 1886	45 07 00	55 09 10	90	2
2703	Aug. 23, 1886	44 01 00	59 02 30	140	2

GRAMPUS RECORD

10019	July 29, 1912	43 30 00	69 48 00	45	1

M. C. Z.

----------	July 25, 1931	42 16 00	66 34 00	160	6

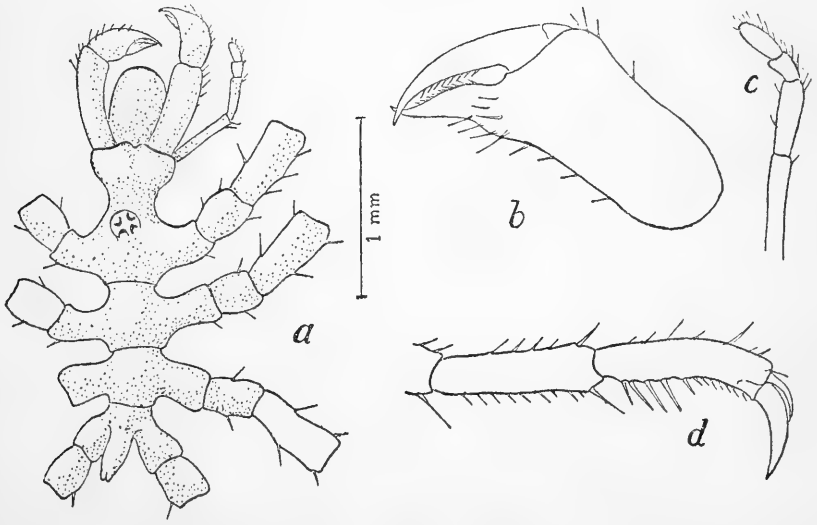

Figure 14.—*Nymphon rubrum* Hodge: *a*, Dorsal view; *b*, chela; *c*, palpus; *d*, tarsus and propodus.

This handsome species is the largest local member of the genus. It is usually about 10 cm. in extent, but mature specimens nearly half that size are known.

Distribution.—Primarily a Boreal-Arctic species, occurring as far north as latitude 82° (Stephensen), but it does not appear to be circumpolar, being unknown west of Baffin Bay or from eastern Siberia. But Hilton (1942a) mentions "*Nymphon gracillipes*" from *Albatross* station 3540 (Bering Sea); although *N. gracilipes* is considered a synonym of *N. strömi*, this record is doubtful. *Nymphon strömi* is common in the New England region from 7 to 100 fathoms, but it has been dredged from over 500 fathoms. The *Albatross* records, stations 2666, 2667, and 2669, off South Carolina and Florida, are the southernmost localities for this species.

NYMPHON RUBRUM Hodge

FIGURE 14

Nymphon rubrum HODGE, 1865, p. 41, pl. 10, fig. 1.—SARS, 1891, pp. 58–61, pl. 5, fig. 2, *a–k*.—NORMAN, 1908, pp. 208–209, pl. 29, figs. 4–7.
Nymphon brevirostre HODGE var. *rubrum* DERJUGIN, 1935, pp. 102ff, 140, fig. 16.
Nymphon rubrum STEPHENSEN, 1935, pp. 9–10.—NEEDLER, 1943, p. 11, fig. 13, *a–c*.

This small species was collected by A. H. Leim in Minas Basin, Nova Scotia, on September 8, 1920. There are four somewhat battered specimens in the lot as lent to me by Dr. Alfreda B. Needler and Dr. A. G. Hunstman, of the Fisheries Research Board of Canada. No specimens seem to have been taken by the U. S. Fish Commission during its intensive investigations of the 70's and 80's. Because of its small size it may have been overlooked, but it is probably rare.

Superficially *Nymphon rubrum* looks like a small *grossipes*, but the lateral processes are more widely separated, and the very long, straight spines on the proximal half of the propodus are not found in any forms of *grossipes*. As the name suggests, the creature is red in life. Stephensen considers *rubrum* very close to if not identical with *N. brevirostre* (Hodge), while Derjugin considers it, together with *N. brevitarse*, a variety of *brevirostre*. (See the discussion under *Nymphon grossipes*.) This species is often identified as *N. gracile* Leach, but neither *N. rubrum* nor *N. brevirostre* has the long fourth joint of the palpus which distinguishes *gracile*, a warm-water species found from the southern coast of England to Morocco and the Mediterranean. According to Sars's figures, *N. rubrum* has tufts of setae at the distal ends of the femur and tibiae, but they are not present in the specimens from Nova Scotia.

Distribution.—Norway to Belgium, British Isles to Plymouth, Nova Scotia.

NYMPHON MACRUM Wilson

FIGURES 13, *d;* 15

Nymphon macrum WILSON, 1880, pp. 487–489, pl. 4, figs. 21–23.
Nymphon brevicollum HOEK, 1881, pp. 45–47, pl. 3, figs. 13–15.
Nymphon macrum SARS, 1891, pp. 89–91, pl. 9, fig. 2, *a–g*.
Nymphon brevicollum WHITEAVES, 1901, p. 263.
Nymphon macrum WHITEAVES, 1901, p. 263.
Nymphon brevicollum OLSEN, 1913, pp. 5–6.
Nymphon macrum STEPHENSEN, 1933, pp. 17–18; 1935, pp. 21–22.—OHSHIMA, 1936, p. 862.—HILTON, 1942a, p. 3.—NEEDLER, 1943, p. 10, fig. 11, *a–e*.

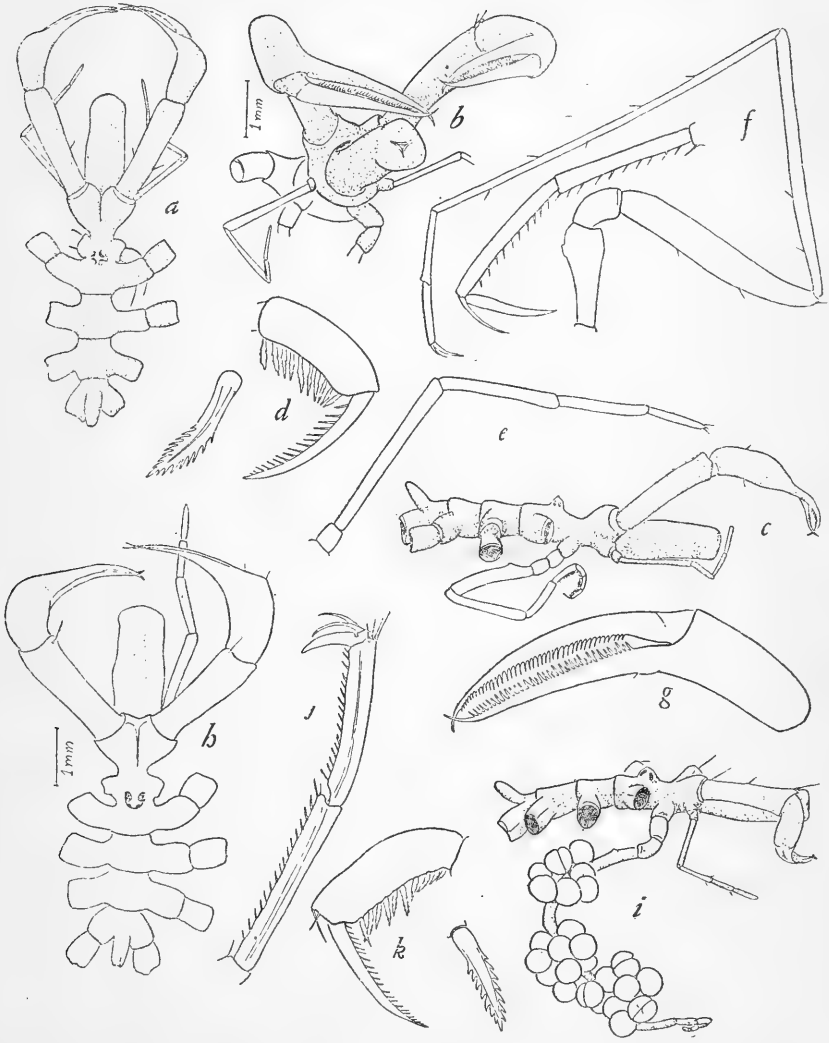

FIGURE 15.—*Nymphon macrum* Wilson, northern form: *a*, Dorsal view of female; *b*, anterior ventral view; *c*, lateral view; *d*, terminal joint of oviger; *e*, palpus; *f*, leg and tarsal joints; *g*, chela. Florida form: *h*, Dorsal view of female; *i*, lateral view of male: *j*, tarsus and propodus; *k*, terminal joint of oviger.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2067	September 1, 1883	42 15 25	65 43 40	122	1
2069	do	41 54 50	65 48 35	101	2
[1] 2071	do	41 56 20	65 48 40	113	2
2115	November 11, 1883	35 49 30	74 34 45	843	1
[2] 2116	do	35 45 23	74 31 25	888	?
2429	June 23, 1885	42 55 30	50 51 00	471	1
2471	July 4, 1885	44 34 00	56 41 45	218	1

[1] This is probably the record given by Stephensen (1933, p. 18): "Collected by the Albatross at 41°50′ N., 65°68′40″ W., abt. 220 m." There is no *Albatross* station for such a position.

[2] *Teste* Hilton; verified by correspondence.

ADDITIONAL RECORDS

Fish Hawk station 7283, lat. 24°17′30″ N., long. 81°53′30″ W., 127 fathoms Feb. 19, 1902, 1 female.

State University of Iowa Bahamas Expedition, between Bahamas and Cuba, 1 male (ov.).

M. C. Z., lat. 42°16′ N., long. 66°34′ W., 160 fathoms, July 25, 1931, W. C. Schroeder coll., 2 females.

This species is somewhat variable in the shape of the neck and separation of the lateral processes. The usual type, as described by Wilson, is illustrated in figure 15, *a–i*. An extreme variety will be found in figure 13, *d*. The type figured by Sars is midway between these extremes. The long chelae with their closely set spinules and the very long auxiliary claws are characteristic of both forms. The two specimens from the Florida region (fig. 15, *h–k*) are too close to *Nymphon macrum* to be considered a separate species in spite of the considerable southern extension in range. The previous record is that by Stephensen (1935), who identified the species from latitude 41°32′ N., longitude 9°5′ W., off Portugal. The principal difference in the Florida type is the heavier tarsal joints and shorter terminal claws.

While this Florida form might be considered a distinct variety of *Nymphon macrum* by some taxonomists, subspecific categories do not seem advisable in a genus whose species are as subject to individual variation as those of this genus. The bewildering array of subspecies, varieties, and forms proposed by certain recent workers may be of some use in emphasizing the degree of variation in their respective species, but their limits are too vaguely defined for taxonomic procedure. It is hard enough to decide what constitutes a species in this genus without adding varieties to the confusion.

Distribution.—A Boreal species, from Massachusetts Bay to the Barents Sea, but sporadically in more southern waters. Ohshima's

Japanese record is a puzzling discrepancy, possibly an error. The bathymetric range of the species in American waters is 35 to 843 fathoms, usually on muddy bottoms.

NYMPHON GILTAYI, new species

FIGURE 16

Types.—Holotype (male): U.S.N.M. No. 37912, Gloucester Donation 360, 1879, schooner *Conductor*, Capt. George H. Curtis (probably from Grand Bank). Paratype (female): U.S.N.M. No. 37912, same locality.

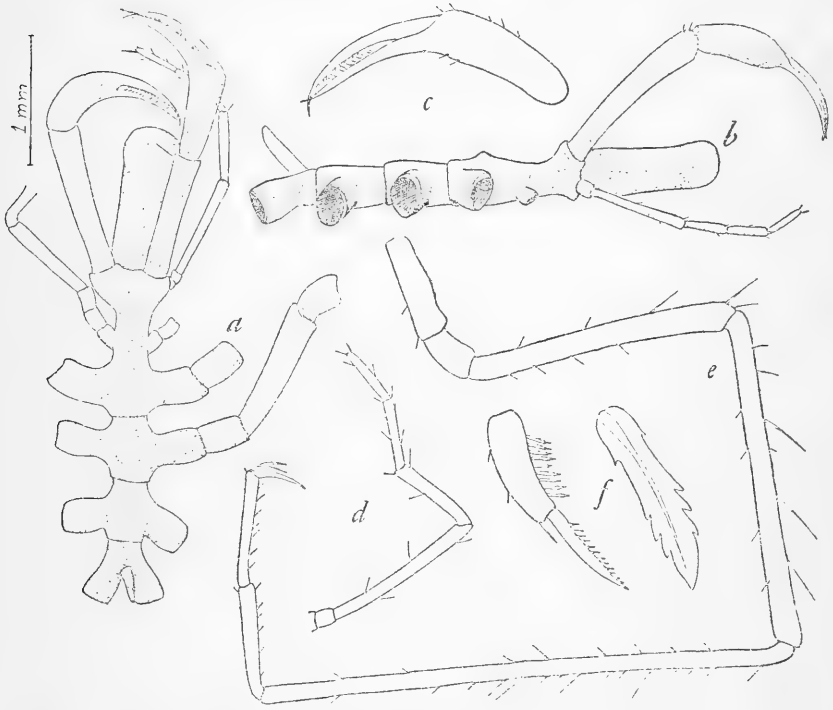

FIGURE 16.—*Nymphon giltayi*, new species: *a*, Dorsal view; *b*, lateral view; *c*, chela; *d*, palpus; *e*, leg; *f*, terminal joint of oviger and denticulate spine.

Description.—Trunk: Lateral processes separated by their own width. Cephalic segment a little longer than proboscis, neck long, ovigers based near the middle. Eye tubercle very low, without eyes.

Proboscis cylindrical, constricted slightly at about its proximal third.

Abdomen short, slightly longer than last lateral processes, directed upward at an angle of about 50°.

Palpus slender, longer than proboscis. Second segment longest, longer than third and fourth segments, which are subequal. Last segment slightly shorter than fourth.

Chelifore: Scape about one-fifth longer than proboscis. Chelae about as long as scape, palm slender, subequal to fingers. Fingers curved, each with about 15 spinules.

Oviger: Fourth and fifth segments about equal, nearly straight and slightly swollen distally. Terminal spine as long as tenth segment, with 12 short, evenly spaced teeth on its distal three-fourths. Denticulate spines rather broad, with about three large broad denticulations. Spine formula: 17:12:9:9.

Leg slender, armed with scattered setae, some of them about three times as long as the diameter of the leg segments. Tarsus and propodus subequal. Auxiliary claws at least half as long as terminal claw. The spines on the propodus are widely spaced and of even size.

Measurements (holotype) as follows:

Proboscis:	*Mm.*	Leg (detached):	*Mm.*
Length	1. 1	First coxa	0. 35
Diameter	0. 3	Second coxa	0. 8
Trunk, length	2. 25	Third coxa	0. 4
Cephalic segment, length	1. 1	Femur	2. 0
Base of chelifores, width	0. 6	First tibia	2. 5
Second lateral process, width	2. 1	Second tibia	4. 0
Abdomen, length	0. 25	Tarsus	0. 8
		Propodus	0. 8
		Terminal claw	0. 4
		Auxiliary claw	0. 25

Remarks.—Except for the long setae on the legs and the absence of eyes, this species resembles *N. macrum*. The chela is smaller and the fingers are armed with comparatively few spinules. Both specimens are somewhat damaged.

NYMPHON FLORIDANUM, new species

FIGURE 17

Nymphon sp. COLE, 1910, p. 196.

Types.—Holotype (male): U. S. N. M. No. 81093, 5 miles south of Loggerhead Key, Tortugas, Fla., 7–10 fathoms, July 20, 1924, W. L. Schmitt coll. (station 32). Paratype (female): U. S. N. M. No. 81093, same locality.

Additional specimens.—As follows, all from Tortugas, Fla.:

1 specimen (fragments); surface tow; April 14, 1906; Leon J. Cole, coll.
1 female; surface tow, attached to floating algae; April 9, 1906, Leon J. Cole, coll.
1 female (recently spawned); surface tow; April 19, 1906; Leon J. Cole, coll.

1 specimen (incomplete); surface tow; April 21, 1906; Leon J. Cole, coll.
1 male; surface tow; April 22, 1906; Leon J. Cole, coll.
1 female; White Shoal; July 19, 1924; W. L. Schmitt, coll.

Description.—Trunk: Lateral processes separated by slightly more than half their own width. Neck variable in length, from as long as the third and fourth trunk segments to half that length. Ovigers based in front of first pair of legs. Eye tubercle bluntly conical, eyes large.

Proboscis roughly cylindrical, constricted near the tip.

Abdomen about as long as last lateral process, directed upward at an angle of about 60°.

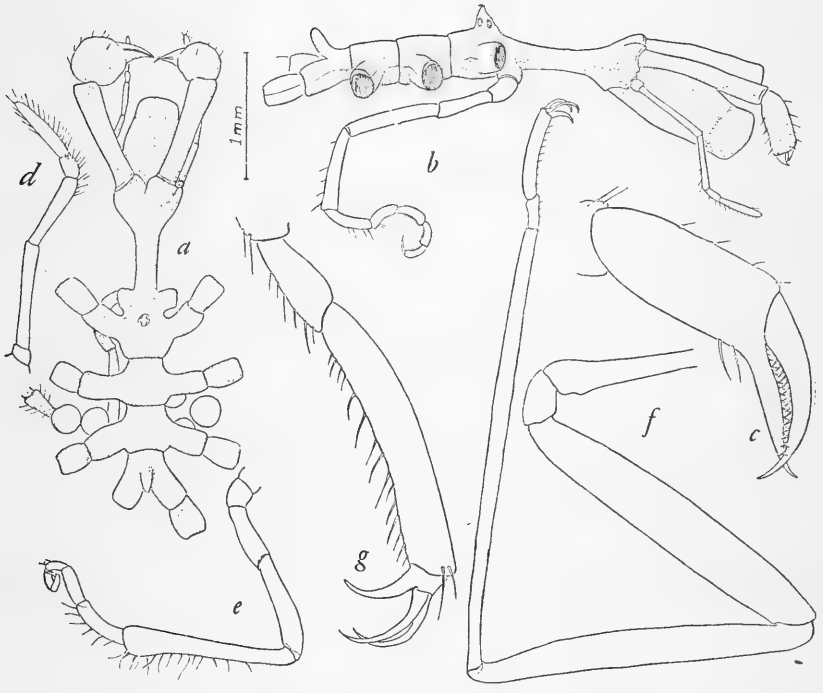

FIGURE 17.—*Nymphon floridanum*, new species: *a*, Dorsal view of holotype; *b*, lateral view of paratype; *c*, chela; *d*, palpus; *e*, oviger of male; *f*, leg; *g*, tarsus and propodus.

Palpus slender, the second joint longest, third and fourth joints subequal and slightly shorter than second. Fourth joint not much longer than wide. There are a few setae on the ventral distal end of the third joint, the ventral margin of the fourth, and on most of the fifth.

Chelifore: Scape slender, about as long as the proboscis. Chela large, fingers about as long as palm, crossed at tip, each with about 15 spinules.

Oviger: Third segment half as long as fourth, fourth half to two-thirds as long as fifth. Fifth segment straight, swollen distally, with slender curved setae on the ventrodistal half. Eggs large, about 0.25 mm. in diameter. Terminal spine as long as terminal segment, without denticulations. Spines on terminal segments apparently without denticulations. Spine formula: 9:9:7: 6.

Leg: Slender, femur and first tibia equal, second tibia about half again as long. Tarsus less than one-third as long as propodus. Propodus slightly curved, with a row of well-separated, slender spines on the sole. Auxiliary claws as long as terminal claw.

Measurements (holotype) as follows:

Proboscis:	*Mm.*	Third leg:	*Mm.*
Length	1. 0	First coxa	0. 5
Diameter	0. 5	Second coxa	1. 2
Trunk, length	2. 5	Third coxa	0. 4
Cephalic segment, length	1. 5	Femur	2. 5
Base of chelifores, width	0. 6	First tibia	2. 5
Second lateral process, width	1. 0	Second tibia	3. 5
Abdomen, length	0. 25	Tarsus	0. 2
		Propodus	0. 75
		Claws	ca. 0. 18

Distribution.—This species is so far known only from the Florida Keys region.

Remarks.—Most of Cole's tow-net material (some of it collected by Mayer, but not so indicated on the labels) varies from the specimens selected as types in that the neck is about half as long. All the specimens agree, however, in the proportions of the tarsal joints, triungulate appearance of the terminal claws, and proportions of the palpal joints. This combination of characters, together with the untoothed terminal claw of the oviger, makes this an easy species to identify. It appears to have no near relatives in the warm Atlantic area.

The European ecological counterpart of *Nymphon floridanum* is *Nymphon gracile* Leach (non *gracile* Sars, 1891, pp. 55–58, pl. 5, fig. 1, *a–h*, which=*Nymphon brevirostre* (Hodge), which in turn is "extremely difficult if not impossible to distinguish" from *N. rubrum* Hodge, according to Stephensen, 1935, p. 9). *Nymphon gracile* has been collected by surface tows at night in considerable numbers (+150 individuals) during its breeding season from January to April at Banyuls-sur-Mer by Fage (1932). One of the specimens of *floridanum* collected by Cole in April (probably in daytime) is a female that had recently discharged its eggs.

Nymphon gracile in not a very close taxonomic relative of *N. floridanum*, however. The tarsal joints of *gracile* are subequal, with a few large spines on the sole of the propodus, the auxiliary claws are half as long as the terminal claw, and the proportions of the palpal joints are conspicuously different. The fourth joint of the palp of

gracile is nearly as long as the third. *N. gracile* is known from the coast of Denmark to the Atlantic coast of Morocco and in the Mediterranean (Bouvier, 1923, pp. 30–31, fig. 24), where it appears to be the only species of *Nymphon*. Bouvier (1923, p. 31) suggests that *N. cienfuegosi* Franganillo (1918) is probably *gracile*. Hilton's record (1942a, p. 7) of *Nymphon gracile* from Alaskan waters appears to be an error for *N. brevitarse* Krøyer, which is understandable in view of the confusion in nomenclature (Hedgpeth, 1943a, p. 89).

Family PALLENIDAE Wilson, 1878

Phoxichilidae Norman, 1908, p. 231.
Pallenidae Marcus, 1940b, p. 21.
Callipallenidae Hilton, 1942b, p. 281. (*Nec* "Callipallenidae (Hoek) 1876"!)

Chelifores present, usually with small chelae; scape 1- or 2-jointed. Palpi usually lacking or represented by rudimentary knobs near the base of the proboscis. Ovigers 10-jointed, with or without a terminal claw, present in both sexes. There are certain species of dubious standing, e. g., "*Pallene palpida*" Hilton (1939, p. 30) and *Oropallene dimorpha* (Hoek, 1898, p. 290), in which the palpus is 4-jointed in the male.

Certain changes in generic names in this family have been proposed that are, to say the least, confusing. Not only do they tax the patience of taxonomists by defeating the purpose of the international rules of nomenclature by an overzealous adherence to them, but also they threaten to turn future synonymies into an inextricable tangle, which would make it impossible for anyone but a specialist to know the precise species under discussion in general or ecological papers.[17]

It all began in 1902 when the Rev. T. R. R. Stebbing published, in an otherwise admirable series of popular articles entitled "The Nobodies, a Seafaring Family," some recommended changes in nomenclature. He proposed *Chilophoxus* as a generic name to supplant the familiar *Phoxichilus* (now known as *Endeis*), then in general use. The *Phoxichilus* of Latreille was really the same as Wilson's *Pseudopallene;* hence the latter name should be discarded in favor of *Phoxichilus* Latreille and the family name Pallenidae be changed to Phoxichilidae.

This argument was taken up and elaborated by Norman (1908), who satisfied himself that *Phoxichilus* auct. nec Latreille and *Chilophoxus* Stebbing were congeneric with *Endeis* Philippi. Norman cited Latreille's (1804, vol. 24, p. 137) original diagnosis, which was vague enough even to apply to *Colossendeis*, although he did refer *Pycnogonum spinipes* O. Fabricius to his *Phoxichilus*. This incorrect diagnosis was elaborated in later editions of Latreille's work, with the further suggestion that *Nymphon femoratum* Rathke and possibly

[17] See Cole's (1910, p. 194) unhappy footnote.

Phalangium spinosum Montagu also belonged to the genus. It is quite obvious that Latreille had no clear idea of generic characters in the Pycnogonida, for these three species belong to widely separated genera. At any rate, *Phoxichilus* Latreille (Stebbing, and Norman) has not been formally accepted in place of *Pseudopallene* Wilson by subsequent workers, although Marcus (1940b, p. 128) advocates its use.[18]

This affair inspired some eloquent objections at the height of the controversy (Loman, 1915; Bouvier, 1917). Certainly the delight that some taxonomists find in resurrecting these desiccated museum names—"ces exercises byzantins!" as Bouvier (1923, p. 3) called it—is not the most praiseworthy occupation with which they might busy themselves. One cannot resist quoting Loman's (1915, pp. 211–216) sentiments: "Et avec un soupir de soulagement ces mots nous échappent: Dieu, merci, enfin, nous y sommes. C'est arrêté."

But Loman sighed for relief too soon, and it was no less a person than Bouvier who, despite his jibes at his fellow taxonomists for their exotic diversions (if one may thus freely paraphrase "exercises byzantins"), contributed the ultimate complication to this tangled tale of generic names. Although he had suggested, in 1917 (p. 29), that he had seen a specimen labeled by Latreille himself as "Phoxychile phalangioides," which was actually a *Pallenopsis*, his information was greeted by a tacit conspiracy of silence. Perhaps no one took him seriously, but finally, in his last paper on the Pycnogonida (1937), Bouvier described this specimen under Latreille's manuscript name *Phoxichilus phalangioides*, suggesting at the same time that it should be considered the genotype and that therefore *Pallenopsis* should be discarded in favor of *Phoxichilus*. This is too much. In the first place, the existence of a named but hitherto undescribed species does not establish that specimen as a genotype, and such sedulous adherence to priority, while it may be a commendable gesture of respect and patriotism by one Frenchman to another, does no service to orderly procedure. Inasmuch as *Pseudopallene spinipes* seems to have been the first species formally referred by Latreille to his genus, it is the genotype by designation, and this *Pallenopsis* identification is simply another demonstration of his foggy conception of what constituted a genus in the Pycnogonida. In the second place, *Phoxichilus* is already a worn-out name, having been confused with two other genera, and to use it for a third genus, previously unsullied by such questionable synonymy, is confounding the confusion. Whatever the arbitrary rules may be, they are not immutable laws, and it would seem

[18] There has been no work on Arctic and European pycnogonids by English authors since Norman's day until Lebour's recent paper (1945). There were a few lists by Carpenter, in one of which (1912, p. 4) he suggested that "*Phoxichilus* had better be dropped altogether." I have already done this, in a previous paper (1943a, p. 88).

wisest to discard both *Phoxichilus* and its unlovely anagram, *Chilophoxus*, altogether, retaining in their stead the names that have been most consistently associated with these forms, at least in the past 40 years, namely, *Endeis*, *Pseudopallene*, and *Pallenopsis*.

As for Latreille's species, while it cannot be assigned to his name as Bouvier tried to do by citing it as *Phoxichilus phalangioides* Latreille (Bouvier), it appears to be a good species, although its general appearance suggests *Pallenopsis denticulata* Hedgpeth (1944) from Western Australia. Its origin is something of a mystery, however, as few members of the genus have been taken from shallow water, and natural-history dredging was practically unknown in Latreille's day. If it is a North Atlantic form, it has yet to be retaken. No species of *Pallenopsis* has been found near the European coast, with the exception of *P. tritonis* Hoek, off the Irish coast, which is a deep-water form.

The proposal to scrap Pallenidae (or Callipallenidae) in favor of Phoxichilidae, whatever the merits of the *Phoxichilus-Pseudopallene-Pallenopsis* controversy may be, is unnecessary and is not required by any rule of nomenclature. As Schenk and McMasters [19] remark, the selection of the first-named genus in a family for the genotype is unsound and has many disadvantages. In this case these disadvantages are obvious: not only are we none too sure of the exact status of Latreille's *Phoxichilus*, but the family name Phoxichilidiidae Sars is so similar that confusion is inevitable unless the name is written "Phoxichilidae (Pallenidae)" as has been done by Calman (1914a) and Gordon (1932).

That Pallenidae should be retained in favor of Callipallenidae (the type genus *Pallene* is a preoccupied name) is another matter; with Marcus (1940b) I agree that Pallenidae can be retained in spite of this change. It is the most appropriate name for a family in which so many generic names are some compound of the original *Pallene:* e. g., *Parapallane*, *Pseudopallene*, *Austropallene*, *Pallenopsis*.

Fortunately the troublesome, ambiguous genera in this family need not concern us here; four genera are known from American waters, and they can be separated on the basis of the characters in the following key:

1. Chelifores usually 2-jointed (sometimes 3-, but with oval trunk); not based on a conspicuous extension over proboscis; without rudimentary palpi 2
   Chelifores 2- or 3-jointed, based on an extension over proboscis; palpi present as rudimentary knobs ..... **Pallenopsis** (p. 209)
2. Without auxiliary claws; legs often heavy and knobby; or, with large globular chelae 3
   Auxiliary claws present; legs not knobby; chelae small ..... **Callipallene** (p. 202)

[19] Procedure in taxonomy, p. 7. Stanford University, 1936.

3. Chelifores 2-jointed; body extended or disciform but not oval 4
   Chelifores 3-jointed; body compact, oval as in *Pycnogonum*.
   Pigrogromitus (p. 214)
4. Without setose fringe (or apparently raised rim) around mouth; chelae globular ..... **Cordylochele** (p. 206)
   With setose fringe around mouth; local forms with prominent spiny processes on trunk and legs ..... **Pseudopallene** (p. 205)

Genus CALLIPALLENE Flynn, 1929

(pro *Pallene* Johnston, 1837)

Chelifore 2-jointed, chelate, opposed in front of proboscis. Oviger 10-jointed, with spines on terminal joints. Propodus without large basal spines, auxiliary claws usually present. Trunk elongate, last two segments often coalesced, cephalic segment prolonged into a neck.

Four species of this characteristic genus have been identified from western Atlantic waters. One of them is a deep-water species, while the other three have all been taken in surface tows at one time or another. Key to the species represented:

1. Eye tubercle low, broad, eyes present 2
   Eye tubercle tall, pointed, without eyes ..... **acus** (p. 204)
2. Neck longer than wide 3
   Neck shorter than wide ..... **emaciata** (p. 204)
3. Propodus short, basal spines short, curved ..... **brevirostris** (p. 202)
   Propodus slender, long, basal spines long, straight ..... **phantoma** (p. 204)

CALLIPALLENE BREVIROSTRIS (Johnston)

FIGURE 18, *a*

Pallene brevirostris JOHNSTON, 1837, p. 380, pl. 12, figs. 7, 8.
Pallene sp. VERRILL, 1873b, p. 415.
Pallene empusa WILSON, 1878b, p. 9, pl. 3, fig. 2, a–g; 1880, pp. 476–477, pl. 2, figs. 5–7.—RATHBUN, 1881, p. 118.—MORGAN, 1891, pp. 8–22 (embryology).
Pallene brevirostris COLE, 1901, pp. 195–207 (habits).—SUMNER, OSBURN, and COLE, 1913, p. 677.—FISH, 1925, p. 161.

RECORD OF COLLECTIONS

Bay of Fundy, 1872, 1 specimen (Y.P.M. No. 4780).

Buzzards Bay, Woods Hole, Mass., July 21, 1909, 3 fathoms, F. B. Sumner, R. C. Osburn, and R. W. Miner colls., 1 male (AMNH).

Entrance to Lagoon Pond, Vineyard Haven, Mass., July 27, 1910, on piles under bridge, R. W. Miner and H. Hall colls., 1 male (ov.), 1 female (AMNH).

Fish Hawk station 8821, off Sandy Point, Chesapeake Bay, July 8, 1920, 2 specimens.

Fish Hawk station 8898, off Thimble Rock, Chesapeake Bay, 28.08 fathoms, December 4, 1920, 3 specimens.

This is the smallest species of pycnogonid from the Woods Hole region. Although it is somewhat larger in extent than *Tanystylum orbiculare*, its body is smaller and the legs are so delicate that the animal looks smaller than it actually is.

Callipallene brevirostris is one of the permanent members of the fauna of the Woods Hole region, although it was apparently not so

common at the time of the biological survey by Sumner, Osburn, and Cole as it was when Morgan studied its embryology there in 1890, or later, when Fish found it almost daily in his surface tows during July and August. In addition to Rathbun's record from Provincetown, Cape Cod, there is the above record from the Bay of Fundy, extending the range of this species to Boreal waters. It does not seem to have been collected from that locality since and the record must be accepted with reservations; it may be a misplaced label.

Distribution.—European littoral, from southwestern Norway to the Mediterranean. Atlantic coast of North America, from Woods Hole southward. There is a specimen in the Woods Hole Oceanographic fouling collection from station H4, off entrance to Tampa Bay, 34 feet, July 19, 1943, indicating the occurrence of this species at least as far south as Florida.

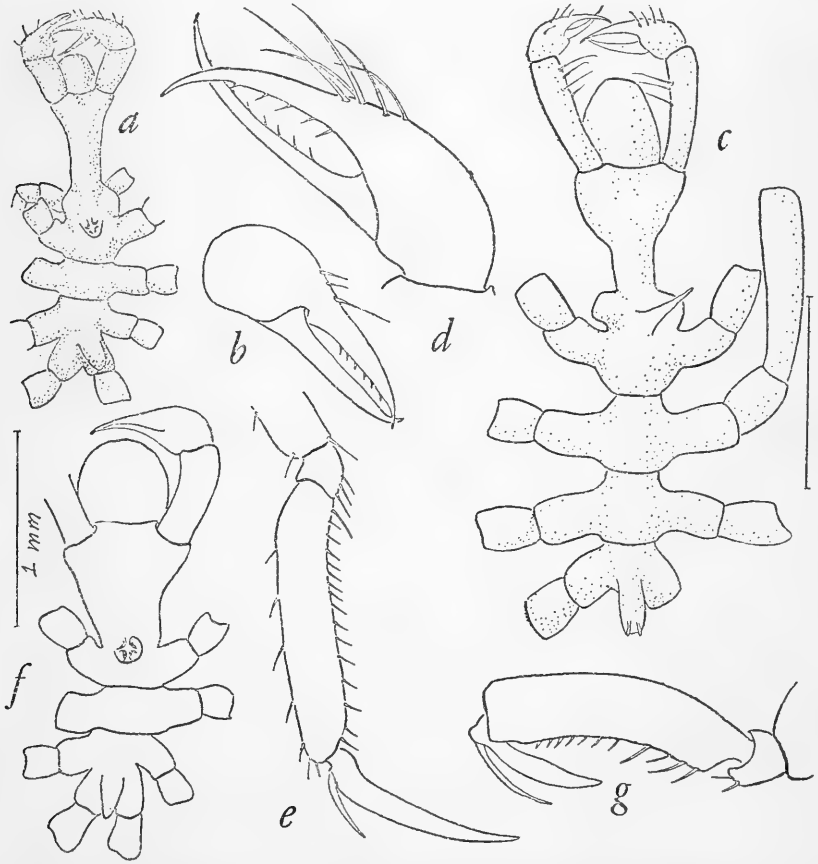

FIGURE 18.—*a*, *Callipallene brevirostris* (Johnston); *b*, *Callipallene phantoma* (Dohrn); *c–e*, *Callipallene acus* (Meinert); *f*, *g*, *Callipallene emaciata* (Dohrn).

CALLIPALLENE PHANTOMA (Dohrn)

FIGURE 18, *b*

Pallene phantoma DOHRN, 1881, p. 196, pl. 14, figs. 1–9.
Pallene producta SARS, 1891, pp. 36–37, pl. 3, fig. 2, a–d.
Pallene phantoma GILTAY, 1934c, pp. 1–5, fig. 1 (synonymy).

RECORD OF COLLECTIONS

Off Bird Key, Fla., surface tow, April 17, 1906, Leon J. Cole coll., 1 female (incomplete).

The single specimen is sadly battered but easily identifiable from the straight propodus with its four long, straight, basal spines. The surface-tow record is of interest, as the specimen appears to be a recently spawned female.

Giltay gives a complete synonymy and a distribution table (p. 4), indicating the occurrence of this species from Trondheim, Norway, to the Azores, and in the Gulf of Naples and the Black Sea.

CALLIPALLENE EMACIATA (Dohrn)

FIGURE 18, *f*, *g*

Pallene emaciata DOHRN, 1881, pp. 193–195, pl. 14, figs. 10–21.—BOUVIER, 1923, p. 36, fig. 29.

RECORD OF COLLECTIONS

Key West, Fla., April 15–27, 1884, 1 specimen (fragments).

Tortugas, Fla., surface tow, April 21, 1906, Leon J. Cole coll., 1 specimen (fragments).

Loggerhead Key, Tortugas, Fla., from algae and old coral rocks, 4 feet, July 14, 1926, C. R. Shoemaker coll., 1 specimen (fragments).

Unfortunately all three specimens are in a fragmentary condition, and their reference to this species is made with some hesitation. The specimens agree with Dohrn's figures, however, and the distribution, i. e., Naples and the Caribbean, is consistent with that of several other species.

Schimkewitsch (1930, p. 245) suggests that this species is synonymous with *Callipallene brevirostris*, and Bouvier (1923, p. 36) states that the two appear to be the same. This implies a considerable range in body proportions which is not evident in the inadequate material before me.

CALLIPALLENE ACUS (Meinert)

FIGURE 18, *c–e*

Pallene acus MEINERT, 1899, pp. 48–49, pl. 4, figs. 8–13.
Pallene hastata MEINERT, 1899, p. 49, pl. 4, figs. 14–19.
Pallene acus BOUVIER, 1917, pp. 26–27, pl. 3, fig. 7.—STEPHENSEN, 1933, p. 20.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2078	Sept. 4, 1883	41 11 30	66 12 20	499	1♂, 1♀
2571	Sept. 1, 1885	40 09 30	67 09 00	1,356	1♂ (ov.)

The form and size of the propodus and terminal claws in these specimens are intermediate between Meinert's figures for *C. acus* and *C. hastata*, supporting Bouvier's conclusion that the species are synonymous.

Distribution.—Evidently a species of the North Atlantic Basin, but infrequently collected. The previous records are Meinert's from Davis Strait and Bouvier's from west of the Azores. The *Albatross* collections are just off the continental shelf southeast of Cape Cod. The bathymetric range, from this scant material, is 499–1,435 fathoms.

Genus PSEUDOPALLENE Wilson, 1878

?*Phoxichilus* Latreille, 1804, p. 137.
Pseudopallene Flynn, 1928, p. 23.

Chelifore 2-jointed, chela usually heavy. Palpus absent. Legs spiny, without auxiliary claws. Oviger 10-jointed. Body usually compact; mouth with a fringe of setae.

A small genus; four, perhaps six, species have been referred to it so far. *Pseudopallene circularis* and *P. spinipes* are widely distributed Boreal-Arctic species, *P. pachycheira* is from the coast of New South Wales, and *P. gilchristi* is a South African species. *Pseudopallene circularis* is the only species known from American waters (New England region), but *P. spinipes* might turn up in future collections off Newfoundland. It is not uncommon at Cape Farewell. Hilton (1942c, p. 39) mentions two Alaskan species, *Pseudopallene setosa* and *P. spinosa*, which may prove to be synonyms of *P. circularis* in view of the wide range of variation recognized for that species. The characters mentioned are inadequate for including the species in the key.

KEY TO THE SPECIES (AFTER FLYNN, 1928)

1. Lateral processes close 2
   Lateral processes separated by more than their own diameter. **gilchristi** Flynn
2. No dorsal tubercles on trunk 3
   Dorsal spines and tubercles present ..... **circularis** (p. 206)
3. Scape longer than proboscis ..... **spinipes** (O. Fabricius)
   Scape equal to or shorter than proboscis ..... **pachycheira** Haswell

PSEUDOPALLENE CIRCULARIS (Goodsir)

FIGURE 19

Pallene circularis GOODSIR, 1842, p. 136, pl. 3.
Pallene hispida STIMPSON, 1853, p. 37.
Pseudopallene hispida WILSON, 1878a, p. 200; 1878b, p. 10, pl. 3, fig. 1, a–e.
Pseudopallene discoidea WILSON, 1878b, p. 12, pl. 3, fig. 3, a–c.
Pseudopallene hispida WILSON, 1880, pp. 478–479, pl. 2, fig. 9.
Pseudopallene discoidea WILSON, 1880, pp. 479–480, pl. 2, fig. 10.
Pseudopallene circularis SARS, 1891, pp. 38–42, pl. 3, fig. 3, a–h.
Pseudopallene hispida WHITEAVES, 1901, p. 263.
Phoxichilus circularis NORMAN, 1908, p. 207.
Pseudopallene circularis STEPHENSEN, 1933, pp. 20–21.—NEEDLER, 1943, p. 12, fig. 15, a–d.

RECORD OF COLLECTIONS

Grampus station 10037, lat. 44°17′ N., long. 68°05′ W., off Frenchmans Bay; July 21, 1912, 22 fathoms, 2 specimens.

The number and position of the spines on the dorsum of the trunk and the shape of the chelae are variable in this species. Specimens from Grand Manan and Eastport are about half the size of those from northwest Greenland. It is not common in the New England region and is unknown south of Cape Cod.

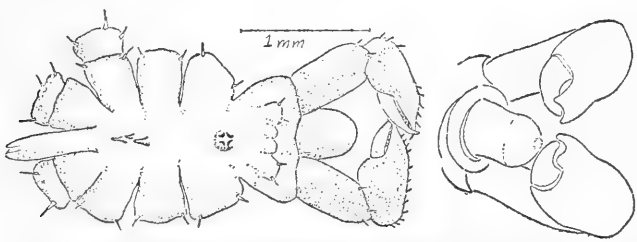

FIGURE 19.—*Pseudopallene circularis* (Goodsir).

Distribution.—A Boreal-Arctic species, from Okhotsk Sea to Northeastern America, perhaps circumpolar.

Genus CORDYLOCHELE Sars, 1888

Chelifore 2-jointed, chelae heavy, almost globular. Trunk completely segmented, elongate, lateral processes well segmented. Ovigers 10-jointed. Without auxiliary claws.

Three, possibly five, species are included in this genus. *Cordylochele malleolata, longicollis,* and *brevicollis* are the species from the North Atlantic. *C. malleolata* and *brevicollis* are very similar, but in *brevicollis* the body is thicker and more compact, and the chelae are not quite so massive as in *malleolata*. *C. brevicollis* is an Arctic species and is not represented in the collections from American waters. Hilton (1942c, pp. 39–40) has published preliminary diagnoses for

two species from the Bering Sea. One of these, *C. setospinosa*, appears to be well characterized by spines and setae on the trunk and legs.

The western Atlantic species can be separated by the following characters:

1. Neck short; lateral processes separated by less than their own diameter. **malleolata** (p. 207)
   Neck long as last three trunk segments; lateral processes separated by more than their diameter **longicollis** (p. 207)

CORDYLOCHELE MALLEOLATA (Sars)

FIGURE 20, *a*

Pallene malleolata SARS, 1879, No. 48.
Cordylochele malleolata SARS, 1891, pp. 45–49, pl. 4, fig. 1, *a–k*.—STEPHENSEN, 1933, p. 25.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2428	June 23, 1885	42 48 00	50 55 30	826	1
2429	do	42 55 30	50 51 00	471	+10
2471	July 4, 1885	44 34 00	56 41 45	218	+5 (inc. ov. ♂♂)
2528	July 13, 1885	41 47 00	65 37 30	677	1

A Boreal-Arctic species from moderate depths; the bathymetric range of the stations above, 218–826 fathoms, extends the known range in both directions.

Distribution.—Cordylochele malleolata is previously known from the waters around Iceland, Spitsbergen, and the Faroes, and in the Kara Sea. Westward it occurs in the Denmark and Davis Straits to latitude 66°35′ N. These are the first records from the American side of the Atlantic.

CORDYLOCHELE LONGICOLLIS Sars

FIGURE 20, *b*

Cordylochele longicollis SARS, 1888, No. 12; 1891, pp. 49–51, pl. 4, fig. 2, *a–g*.—STEPHENSEN, 1933, pp. 25–26.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2666	May 5, 1886	30 47 30	79 49 00	270	1
2667	do	30 53 00	79 42 30	273	2

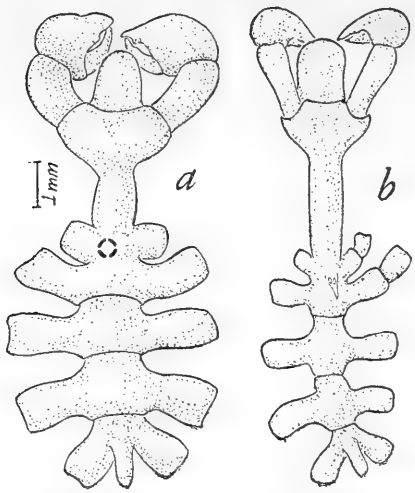

FIGURE 20.—*a*, *Cordylochele malleolata* (Sars); *b*, *Cordylochele longicollis* Sars.

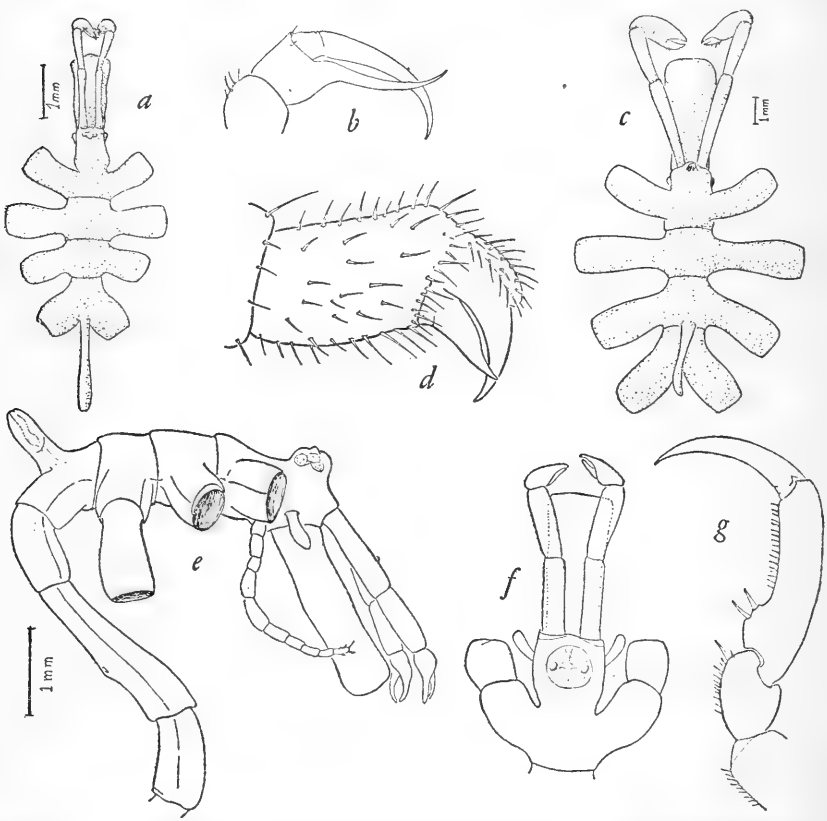

FIGURE 21.—*a*, *b*, *Pallenopsis longirostris* Wilson; *c*, *d*, *Pallenopsis forficifer* Wilson; *e–g*, *Pallenopsis calcanea* Stephensen.

These records represent a considerable southern extension of the known range of this species.[20] It occurs in the north Atlantic south of the Wyville Thomson Ridge and in Davis Strait.

Genus PALLENOPSIS Wilson, 1881

Pallenopsis Wilson, 1881, p. 250.—Loman, 1916, pp. 15–25.—Calman, 1923, p. 281 (key).
Phoxichilus Bouvier, 1937, pp. 3–11.
Pallenopsis Marcus, 1940a, pp. 181–182.

Chelifores 2- or 3-jointed, chelae small. Palpi present as minute knobs or small papillae. Oviger 10-jointed, without terminal claw, present in both sexes, but reduced in the female. Trunk elongate, legs long, slender, propodus well developed, usually with auxiliary claws and basal spines.

There are more than 30 species in this genus, many of them separated by minor characters. Fortunately there are not many species known from north Atlantic waters. Three species are included in the fauna of the waters adjacent to the United States, and a fourth, *Pallenopsis calcanea*, has been found off Labrador and Bermuda.

1. Propodus without a well-developed heel, auxiliary claws present 2
   Propodus with a prominent heel with two basal spines, auxiliary claws lacking ..... **calcanea** (p. 211)
2. Fingers of chelae shorter than palm, wedge-shaped 3
   Fingers of chelae longer than palm, slender, bowed, and crossing at tips. **longirostris** (p. 210)
   [Proboscis somewhat smaller at tip (not slightly expanded as in *longirostris*); fingers of chelae curved about as long as palm (eastern Atlantic, near British Isles) ..... *tritonis* Hoek]
3. Lateral processes about twice as long as their diameter; chelae with a prominent spiny cushion at base of dactylus ..... **forficifer** (p. 209)
   Lateral processes not much longer than their diameter, widely separated; spiny cushion on chelae very low, inconspicuous ..... **schmitti** (p. 212)

PALLENOPSIS FORFICIFER Wilson

Figure 21, *c*, *d*

Pallenopsis forficifer Wilson, 1881, pp. 250, 252, pl. 4, figs. 15–18, pl. 5, fig. 23.—Hedgpeth, 1943b, p. 43.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2666	May 5, 1886	30 47 30	79 49 00	270	4
2667	do	30 53 00	79 42 30	273	5
2668	do	30 58 30	79 33 30	294	4
2669	do	31 09 00	79 33 30	352	3

[20] Stephensen (1933, p. 6), mentions a specimen in the Zoological Museum of Copenhagen from "off E. America abt. 37° N," which is probably from *Albatross* material, but I could find no record of it. Selections from a number of *Albatross* lots were sent to Meinert at some time or another.

FISH HAWK RECORD

7285	Feb. 19, 1902	24 15 00	81 47 30	306	1

UNIVERSITY OF IOWA BAHAMAS EXPEDITION

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
56	June 27, 1893	24 16 00	81 22 00	200	1
62	June 29, 1893	Off American Shoal Light		70–80	1♂ (ov.), 1♀

This species can be distinguished by the prominent spiny cushion on the chelae and the long lateral processes, which are splayed out so that they are more widely separated distally than at their origin. The propodus is rather long, and the basal spines are irregular in size and location. The articulation of the scape is very indistinct in many specimens.

Distribution.—Restricted to the warm waters south of Cape Hatteras and in the Caribbean, from 200 to 352 fathoms. The northernmost record is that given by Wilson: *Blake* station 318, lat. 32°25′ N., long. 77°42′30″ W., 262 fathoms.

PALLENOPSIS LONGIROSTRIS Wilson

FIGURE 21, *a*, *b*

Pallenopsis longirostris WILSON, 1881, pp. 252–253, pl. 4, figs. 19–22; pl. 5, figs. 24, 25.
Phoxichilidium oscitans HOEK, 1881, pp. 89–90, pl. 13, figs. 1–5.
Pallenopsis longirostris VERRILL, 1885, p. 561.
Pallenopsis plumipes MEINERT, 1899, pp. 51–52, pl. 4, figs. 1–7.
Pallenopsis longirostris GILTAY, 1942, p. 459.—NEEDLER, 1943, p. 13, fig. 16.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2046	July 31, 1883	40 02 49	68 49 00	407	1
2470	July 4, 1885	44 47 00	56 33 45	224	1
2554	August 9, 1885	39 48 30	70 40 30	445	1
2628	October 21, 1885	32 24 00	76 55 30	528	2 (ov. ♂)
2699	August 22, 1886	45 04 00	55 23 00	79	1
2734	October 26, 1886	37 23 00	73 53 00	841	1

Most of these specimens have a pale, flabby appearance in their preserved state. The proboscis is larger at the tip than described by Wilson, and the "long natatory bristles" mentioned by Meinert in his description of *P. plumipes* are well developed in some of these speci-

mens but lacking in others. Hence I cannot keep the two species apart. Nor, for that matter, can I find any well-defined character for separating *Pallenopsis oscitans* (Hoek), dredged by the *Challenger* west of the Azores from 1,675 fathoms. The chelae are very similar, and the expanded appearance of the front margin of the cephalic segment in Hoek's figure is not of specific importance and may be more apparent than real. *Pallenopsis longirostris* appears to be a variable species, and the variation in this handful of specimens indicates that both *plumipes* and *oscitans* should be included under this name.

Distribution.—Northeastern Atlantic, Cabot Strait, and Western Atlantic as far south as latitude 32° N., 79 to 1,675 fathoms.

PALLENOPSIS CALCANEA Stephensen

FIGURE 21, *e–g*

?*Pallenopsis* sp. GORDON, 1932, pp. 91–92, fig. 45, *a–c*, fig. 74, *c*.
Pallenopsis calcanea STEPHENSEN, 1933, pp. 21–24, fig. 5.

RECORD OF COLLECTIONS

Bermuda circle [center, lat. 32°12′N., long. 64°36′W.], Net 206, 660 fathoms (deep tow), June 22, 1929, William Beebe coll., 1 female.

This specimen is about the same size as those described by Stephensen. It appears to be a mature female; the genital pores are large, on slight elevations of the *dorsal* surface of the second coxae. The rudimentary (or vestigial?) palpus is larger than in Stephensen's material, and the development of the heel seems to be intermediate between the *Godthaab* specimens from Davis Strait and off Labrador and Gordon's immature specimen from *Discovery* station 256 (lat. 35°14′S., long. 6°49′E., off South Africa; a deep tow between 850–1,100 meters). There is a suggestion of a vestigial auxiliary claw in this specimen. Inasmuch as Stephensen did not give detailed measurements, the following should be of interest:

	Mm.		*Mm.*
Proboscis:		Third leg:	
Length	2. 0	First coxa	1. 75
Diameter at tip	0. 6	Second coxa	2. 18
Trunk	3. 5	Third coxa	1. 25
Cephalic segment	1. 5	Femur	5. 7
Width	2. +	First tibia	5. 75
Abdomen	0. 75	Second tibia	4. 50
Scape	1. 9	Tarsus	0. 48
		Propodus	1. 0
		Claw	0. 6+

Distribution.—Evidently a bathypelagic species of the North and (probably) South Atlantic, and the southern Indian Ocean, occurring at depths of from 500 to 1,000 fathoms. It may be world-wide.

PALLENOPSIS SCHMITTI Hedgpeth

FIGURE 22

Pallenopsis schmitti HEDGPETH, 1943b, p. 44 (diagnosis).

ALBATROSS COLLECTIONS

Station No.	Date	Lat. N.	Long W..	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2138	Feb. 29, 1884	17 44 05	75 39 00	23	1 ♀
2143	Mar. 23, 1884	9 30 45	76 25 30	155	1 ♀
2641	Apr. 9, 1886	25 11 30	80 10 00	60	1 ♂

W. L. SCHMITT—TORTUGAS

------	June 10, 1925	Tortugas, Fla. (10 miles south of No. 2 buoy, "olive buff and gallstone yellow").	35–37	5
------	Aug. 4, 1931	South of Tortugas, Fla.	40	1 male and 1 female (cotypes: U.S.N.M. No. 76517).
------	----do----	----do----	------	10 (paratypes: U. S. N. M. No. 76516).

ADDITIONAL RECORDS

University of Iowa Expedition, Bahamas, 4 specimens.

Tortugas, Fla., June 1908, 8–10 fathoms, among Bryozoa, R. C. Osburn coll., 1 specimen.

Pelican station 169–7, January 18, 1940, lat. 28°24.5′ N., long. 80°03′ W., try net, 45 fathoms, 1 male (ov.).

Johnson-Smithsonian Expedition station 78, February 25, 1933, north of Puerto Rico, lat. 18°29′ N., long. 65°31′ W., about 100 fathoms, 1 specimen.

Description.—Trunk slender, elongated, fully segmented. Lateral processes separated by nearly twice their own diameter. Cephalic segment not widened in front. Eye tubercle conical, acute, but not placed at the extreme anterior end of the cephalic segment as in *P. forficifer*. Eyes pigmented, large; the anterior pair two or three times as large as the posterior pair.

Proboscis about as long as cephalic segment.

Abdomen long, clavate.

Chelifore slender, scape 2-jointed, the first joint as long as the second and nearly as long as the proboscis. Fingers shorter than palm, broad, meeting when closed.

Palpus represented by a rounded knob.

Oviger 10-jointed; in the male the fifth joint is curved and armed with a row of backward-pointing spines at its distal end; the sixth joint is about half as long as the fifth and twice as curved, with reversed spines generally distributed. Terminal segments diminishing in size.

Leg long. Second coxa and femur with a few setae dorsally. First tibia covered dorsally and distally with long setae, as long as twice the diameter of the joint. Second tibia covered with shorter setae. Tarsus very short, propodus thick, with several large, heavy spines on the sole. Auxiliary claws large. The femoral cement gland tube is large, thick-walled, and nearly straight.

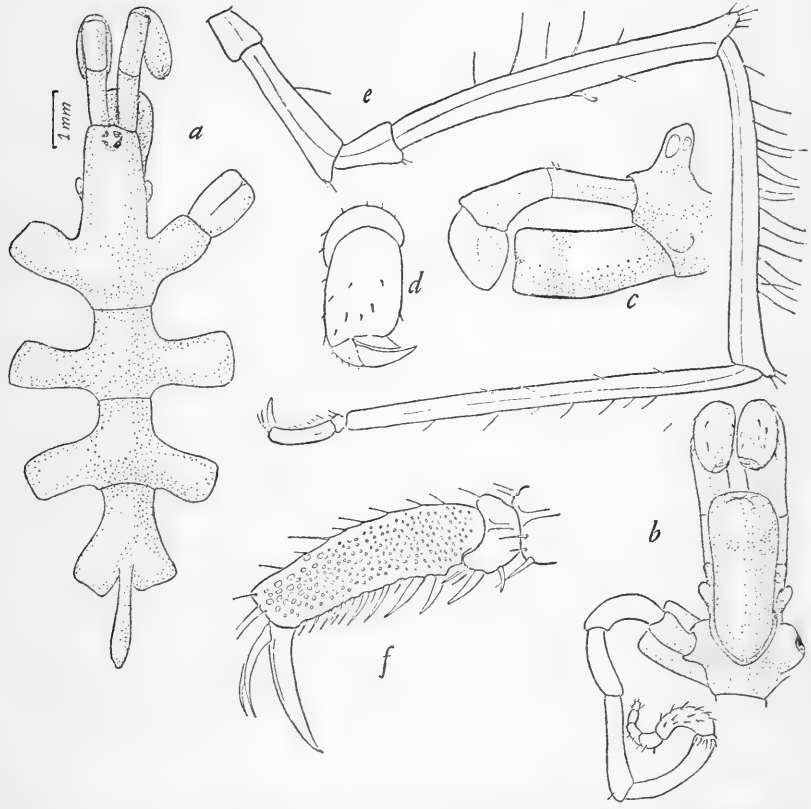

FIGURE 22.—*Pallenopsis schmitti* Hedgpeth: *a*, Dorsal view of cotype (male); *b*, ventral view; *c*, lateral view of chelifore and proboscis; *d*, chela; *e*, leg; *f*, tarsus and propodus.

Measurements (male) as follows (from L. Giltay):

	Mm.
Proboscis, length	2. 5
Trunk, length	7. 0
Abdomen, length	2. 0
Scape:	
First segment	1. 75
Second segment	1. 0

Fourth leg:	*Mm.*
First coxa	1. 75
Second coxa	4. 0
Third coxa	2. 0
Femur	9. 0
First tibia	9. 0
Second tibia	10. 0
Tarsus+propodus	2. 0

Remarks.—This species is characterized by the short, widely separated lateral processes and the heavy appearance of the spines and claws of the propodus. In some specimens the setae on the legs are very fine. The segmentation of the chelifore is difficult to see in many specimens. The lateral chitinous line of the legs and trunk extends out on the scape of the chelifore.

The foregoing description is quoted, with necessary alterations, from a manuscript by the late Dr. Louis Giltay. I am glad to concur with him in dedicating the species to Dr. Waldo L. Schmitt, of the United States National Museum. Unfortunately circumstances made it impossible to preserve Giltay's authorship.

Distribution.—A Caribbean species, from Tortugas, Fla., to the Gulf of Darién; from relatively shallow water, 8–10 to 155 fathoms.

Genus PIGROGROMITUS Calman, 1927

PIGROGROMITUS TIMSANUS Calman

FIGURE 23, *a–d*

Pigrogromitus timsanus CALMAN, 1927, pp. 408–410, fig. 104, *a–f*.

Record of collection.—Lake Worth, Fla., August 28, 1943, WHOI fouling collection, station G 22, 3 feet, 9 specimens, including ovigerous male.

With the exception of a somewhat stronger terminal claw of the oviger, these Florida specimens are inseparable from those found by Calman in the Suez Canal. It is probable that the difference in the oviger is due more to the angle at which the structure became fixed under the cover glass than to actual differences, since the rest of the armature of the oviger is so similar. The Florida specimens are about the same size as the types, and the proboscis has the same partial constriction in the middle (not well shown in Calman's dorsal view, fig. 104a). The egg mass is single, as in *Pycnogonum*.

The occurrence of this species in the Suez Canal and the Florida coast region is an interesting distribution puzzle, although not a surprising one, in view of the distribution of various other species on both sides of the Atlantic. The transitional peculiarities of this form have already been commented upon (Hedgpeth, 1947, p. 7). In consulting the passage of *Twelfth Night* from which the name of this genus was borrowed, I find the following: "In sooth, thou wast in very gracious fooling last night, when thou spokest of Pigrogromitus, of the Vapians passing the equinoctial of Queubus . . ." (Act. II, sc. iii). In sooth, we taxonomists are hard put to it to find names, but there have been far worse sources than the nonsense of Will Shakespeare. It seems that Barnard (1946, p. 63) is of the same opinion, for he has suggested *Qucubus* as a generic name for a form somewhat resembling *Pigrogromitus*, although it differs from it in lacking both chelifores and palpi. Inasmuch as this new form is so far known only from a

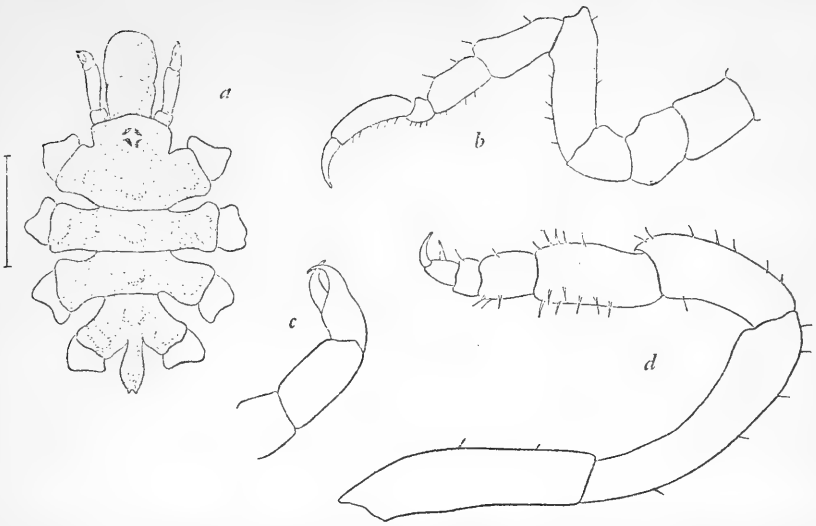

FIGURE 23.—*Pigrogromitus timsanus* Calman: *a*, Dorsal view of male; *b*, third leg of male; *c*, chelifore; *d*, oviger.

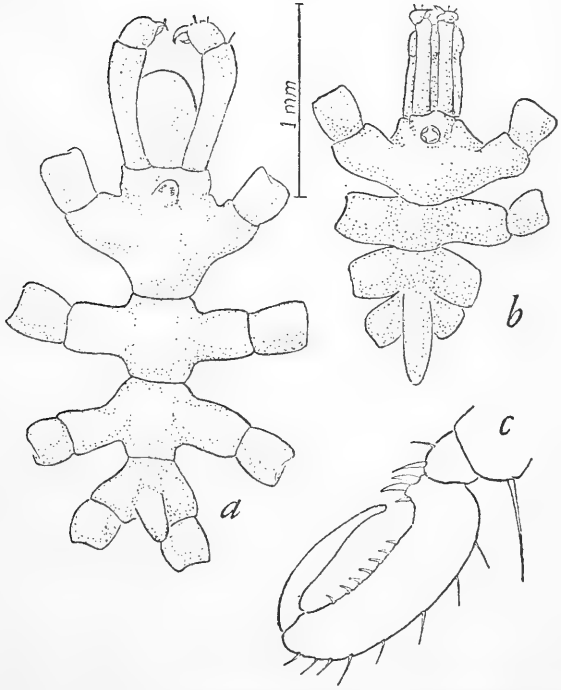

FIGURE 24.—*a*, *Phoxichilidium femoratum* (Rathke); *b*, *c*, *Halosoma robustum* (Dohrn).

preliminary diagnosis, it is not possible to discuss its relationships adequately. It does, however, have 10-jointed ovigers.

Family PHOXICHILIDIIDAE Sars, 1891

Phoxichilidiidae MARCUS, 1940b.

The principal characters of this family are the presence of ovigers only in the male (there may be rudimentary stumps in some females), 2-jointed chelifores, and the absence of palpi. The ovigers are usually 6-jointed but vary from 5- to 9-jointed.

The genera and species in this family are vaguely defined; many of the species, especially in the genus *Anoplodactylus*, may be synonyms, and all told the family is a difficult problem for the taxonomist. It is of particular interest to the ecologist and student of animal distribution because of the pelagic habit of several of its species.

Three genera, keyed as follows, are recognized in the waters under consideration:

1. Cephalic segment extended forward as a conspicuous neck, overhanging insertion of proboscis (auxiliary claws minute)----**Anoplodactylus** (p. 218)
   Cephalic segment not extended forward---- 2
2. Lateral processes separated by at least their own diameter; propodus with auxiliary claws----**Phoxichilidium** (p. 216)
   Lateral processes separated by less than their own diameter; auxiliary claws minute----**Halosoma** (p. 217)

[The distinction between *Phoxichilidium* and *Halosoma* applies only to the species in this paper.]

Genus PHOXICHILIDIUM Milne-Edwards, 1840

Phoxichilidium MARCUS, 1940b, pp. 36–39.

Chelifore 2-jointed, chela small. Palpi lacking. Ovigers 5- or 6-jointed, present only in males. Propodus with prominent auxiliary claws. The cephalic segment is not markedly projected over the insertion of the proboscis.

This genus is represented by a single species, *P. femoratum*, in the waters of eastern North America.

PHOXICHILIDIUM FEMORATUM (Rathke)

FIGURE 24, *a*

Nymphon femoratum RATHKE, 1799, p. 201.
Phoxichilidium maxillare STIMPSON, 1853, p. 37.
Phoxichilidium femoratum VERRILL, 1874a, p. 45.
Phoxichilidium maxillare WILSON, 1878b, pp. 12–13, pl. 4, fig. 1, *a–e*.
Phoxichilidium minor WILSON, 1878b, pp. 13–14, pl. 4, fig. 2, *a–f*.
Phoxichilidium maxillare WILSON, 1880, pp. 480–481, pl. 3, figs. 12–15.
Non *Phoxichilidium maxillare* MORGAN, 1891.
Phoxichilidium maxillare WHITEAVES, 1901, p. 263.—PEARSE, 1914, p. 77.
Phoxichilidium femoratum NEEDLER, 1943, p. 14, fig. 18, *a–f*.—LEBOUR, 1945, p. 146, figs. 1, *a–c*, 2*a*.

This is one of the commonest littoral pycnogonids of the New England coast north of Cape Cod and is sparingly found as far south as Long Island Sound. It is found also on the coast of Europe from Norway to France, Iceland, Greenland, and on the Pacific coast of North America as far south as the Los Angeles region, but it has not been reported from Japan. The bathymetric range in the New England region is from shore line to 55 fathoms. According to Lebour, this species lives principally on *Syncoryne*. This author has proposed (1945, pp. 147–150) another species, *P. tubulariae*, which is smaller and has a longer abdomen and a somewhat different armature of spines on the propodus. The larvae are found in the gastral cavity of *Tubularia*. The anatomical characters of this species, with the exception of the longer abdomen, agree with Wilson's (1878b) *P. minor*, which he subsequently (1880) reduced to synonymy under *P. maxillare*. His figures of the tarsus of this smaller variety agree very much with Lebour's figure (2*b*) of the tarsus of her *P. tubulariae*. It would appear that *P. minor* is an intermediate form between *femoratum* and *tubulariae* and that it would be very difficult to keep these species apart, although they may represent *bona fide* geographic races. Lebour's form should probably be considered a variety rather than a full species. Obviously this species requires further study, based on a large series of specimens.

Genus HALOSOMA Cole, 1904

Halosoma Cole, 1904a, p. 286; Hilton, 1915, p. 69; Marcus, 1940b, pp. 43–46.

Chelifores 2-jointed, with small chelae. Palpi lacking. Oviger 5- or 6-jointed. The trunk is compact, shield-shaped or circular, and with no conspicuous neck. There are minute auxiliary claws.

This genus was established by Cole (1904a, p. 286) on a single female specimen. The oviger of the genotype, *Halosoma viridintestinale*, has not been figured previously (fig. 25, *a*). Hilton was in error in de-

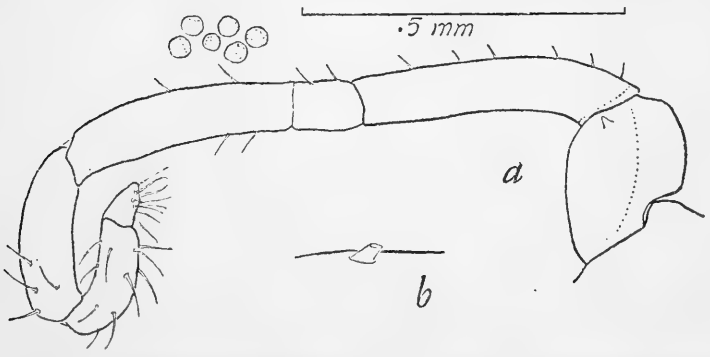

Figure 25.—*Halosoma viridintestinale* Cole: *a*, Oviger; *b*, femoral cement gland.

scribing it as 5-jointed; there are six articulated joints and a segmentation near the base of the third joint. As generic characters, distinguishing *Halosoma* from *Phoxichilidium*, Cole (loc. cit.) mentions the compact body with the last pair of lateral processes slightly separated from the preceding pair and the intermediate development of the neck (between *Phoxichilidium* and *Anoplodactylus*). The position of the lateral processes is somewhat variable in the genotype, however, and in a few specimens the body is completely circular. The femoral cement gland of *Halosoma viridintestinale* is of particular interest (fig. 25, *b*). Viewed from directly above, it appears to be a circular opening at about the middle of the dorsal surface of the femur. From the side, however, it is a very short tubular process. The walls of the tube are transparent and cannot be easily demonstrated. Genital protuberances occur on the last two pair of coxae in the genotype, about a third as long as the width of the joint, rounded.

HALOSOMA ROBUSTUM (Dohrn)

FIGURE 24, *b*, *c*

Phoxichilidium robustum DOHRN, 1881, p. 188, pl. 12, figs. 13–18.
Anoplodactylus robustus BOUVIER, 1923, p. 43, fig. 40.
Halosoma robustum MARCUS, 1940b, pp. 68–71, fig. 8, *a-c*.

RECORD OF COLLECTIONS

Loggerhead Key, Tortugas, Fla., from algae and old coral rock, 4 feet, July 14, 1926, C. R. Shoemaker coll., 1 specimen (female).

This single female specimen appears to be *Halosoma* because of the slightly developed neck and narrowly separated lateral processes. The forward end of the cephalic segment is raised, and there are long spines on the tibiae as in *H. robustum*. Identification of an isolated female in this family is subject to reservation, however, and further collections may prove this to be another species, possibly *Phoxichilidium virescens* Hodge.

Genus ANOPLODACTYLUS Wilson, 1878

Anaphia SAY, 1821, p. 59.
Anoplodactylus WILSON, 1878a, p. 200; 1880, p. 482.
Anaphia NORMAN, 1908, p. 202.
Anoplodactylus MARCUS, 1940b, pp. 38–43.—WILLIAMS, 1941, pp. 33–35.—LEBOUR, 1945, pp. 154–155.

Chelifores 2-jointed, with small chelae. Palpi lacking, but females in many species with peculiar processes on ventral surface of proboscis. Oviger usually 6-jointed (nine in *A. spinosus* Möbius). Auxiliary claws reduced or minute. Males with conspicuous femoral cement glands, of various types.

Although Wilson (1880) suggested that his *Anoplodactylus* might be congeneric with *Anaphia* Say, he preferred to retain *Anoplodactylus* until specimens from South Carolina, the type locality of Say's

Anaphia pallida, might be collected which would clarify the status of Say's genus. Since that time more than 30 species have been referred to *Anoplodactylus*, and Norman's attempt to reinstate *Anaphia* was ignored by taxonomists (with the exception of Carpenter, 1912) and has received but one recognition in ecological literature (Lebour, 1916). In her most recent paper Lebour (1945) returns to *Anoplodactylus* without comment.

According to the collections studied for this review, *Anoplodactylus lentus* Wilson is the commonest species of pycnogonid on the coast of South Carolina, but *Phoxichilidium femoratum* (Rathke), the species to which Say's description might also apply inasmuch as it was based on female specimens, does not occur south of Long Island Sound (see fig. 26). Say's types appear to be no longer in existence, which makes it impossible to settle the matter with absolute finality.[21] Even if the types were still extant, however, more would be lost than gained by restoring Say's genus. Such a procedure would cause more unnecessary confusion in a group which has already had more than its share of such unhappy taxonomy. Therefore it is urged that *Anoplodactylus* Wilson be retained and that *Anaphia* Say be rejected from further consideration, and be relegated to the status of a *nomen oblitum*, since it has not been in general use for more than 30 years. It is understood that this modification in the International Rules may be considered by the next committee.[22]

The principal character of this genus is the prominently developed neck. The oviger is usually 6-jointed (with a nonarticulated segmentation on the third joint in many species). Wilson considered the apparent absence of auxiliary claws a generic character and coined his name to describe that condition, but minute auxiliary claws are present in most of the species, including *Anoplodactylus lentus*. The femoral cement glands of the males are of several types: In *A. lentus* the opening is a long slit on the median dorsal surface; in *A. petiolatus* it is a short, tubular projection; and in *A. insignis* it is an oval cribriform aperture. Still another form, which seems to be transitional between the tubular and cribriform types, is found in *A. quadratispinosus*. This is a curious transparent vesicle (fig. 32, *b*), with a pore at the summit.

The females of many species have peculiar processes or tubercles on the ventral surface of the proboscis. In some species these are simple knobs; in others they are elaborate lobed processes. Their function and anatomical significance are obscure; Calman (1923, p. 289) has pointed out that they cannot be considered embryonic

[21] I am indebted to Dr. Richard A. McLean, who kindly searched the Say collections at the Academy of Natural Sciences of Philadelphia in my behalf for Say's types. How fortunate that Rafinesque described no pycnogonids!

[22] See Ernest Mayr, "Systematics and the Origin of Species," p. 17, 1942.

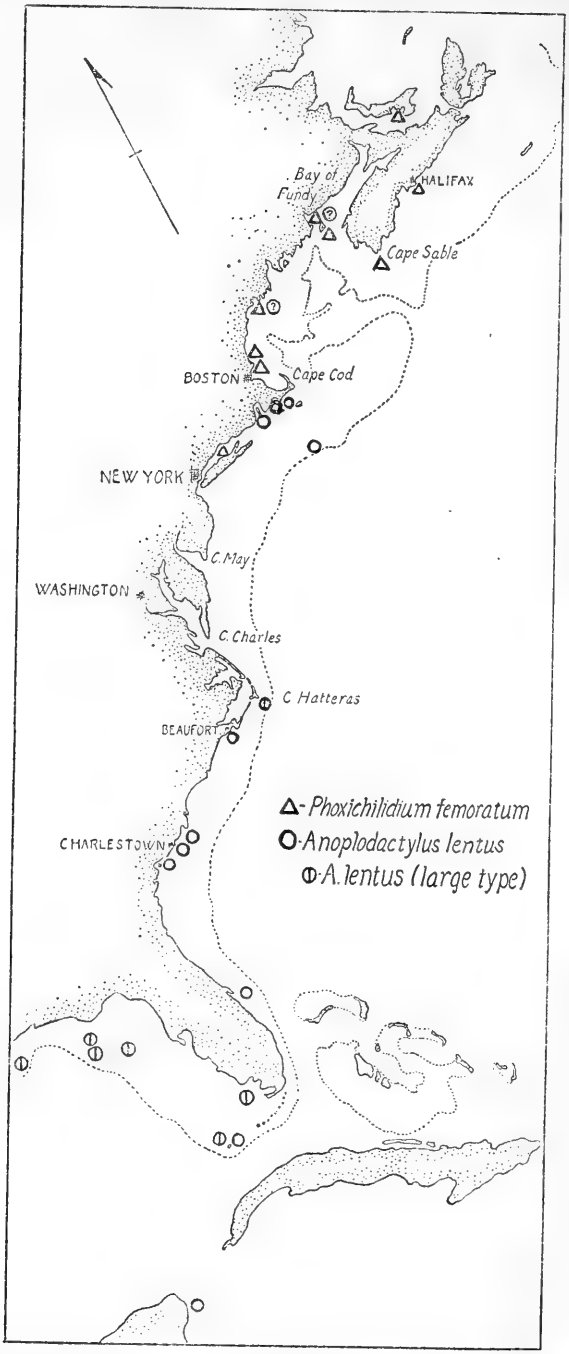

FIGURE 26.—Distribution of *Anoplodactylus lentus* Wilson and *Phoxichilidium femoratum* (Rathke).

limb buds, "since the proboscis, whatever its morphological nature may be, is not a somite."

On the whole, the species of *Anoplodactylus* are a nondescript lot of variable organisms separated by rather vaguely defined characters, and identification is not always certain unless both sexes are available. There are at least 13 species from the Caribbean region alone, 11 of which are included in the following key, according to general characters applicable to both sexes. An unidentifiable species (A, p. 236) from Tortugas is not included in this key, but the male is separable from all the other species in the region on the basis of a very slndeer tubular cement gland at the distal end of the femur. Another species (B, p. 236), represented by a single damaged female specimen, can be separated on the basis of its large chelae, unadorned legs, and a short, tuberclelike projection on the propodus.

Williams, in his short paper on the "revision" of this genus (1941), presents a map indicating the occurrence of *Anoplodactylus parvus* off Venezuela instead of Bermuda, *A. maritimus* just east of the Virgin Islands instead of south of the Azores, and placing Bermuda about 5° east of its true position. It is unfortunate that more care was not devoted to the preparation of this map, which does indicate the predominantly tropical distribution of the genus.

KEY TO THE SPECIES OF ANOPLODACTYLUS DISCUSSED IN THIS REPORT

1. Second tibia not markedly shorter than first 2
   Second tibia less than half as long as first ..... **evelinae** (p. 232)
2. Proboscis cylindrical 3
   Proboscis styliform ..... **stylirostris,** new species (p. 232)
3. Eye tubercle and abdomen not conspicuously long; sole of propodus without square spines 4

   [Fingers of chelae (spinose, except at tips?) conspicuously longer than palm (usually about as long as palm in other species in this group); propodus with a long, bluntly rounded projection at its distal end (Mediterranean, North Africa). (Sp. B, p. 236, has a short tubercle on the propodus).
   massiliensis Bouvier]

   Eye tubercle and abdomen very long, erect; sole of propodus with a row of square spines ..... **quadratispinosus** (p. 232)
4. With prominent conical or rounded projections at end of femur 12
   Without such processes on femur 5
5. Basal spines of propodus simple 6
   Largest basal spine denticulate ..... **pectinus,** new species (p. 234)
6. Fingers long, slender, with setae; palm elongate or angular 7
   Fingers of chela short, curved, opposed, or slightly crossed 8
7. Eye tubercle very low, eyes present ..... ?**maritimus** (p. 230)
   Eye tubercle imperceptible or lacking, eyes absent ..... **typhlops** (p. 228)
8. With low tubercles at ends of lateral processes, or basal spines of propodus less than half as long as width of propodus 9
   Without tubercles or processes on lateral processes; basal spines on propodus at least half as long as width of the propodus ..... **lentus** (p. 225)
9. Eye tubercle not conical or conspicuously broader at base; two or three or more large spines on heel of propodus 10

746333—48——5

Eye tubercle conical, with a broad base; one or two large curved spines on heel of propodus ..... **carvalhoi** (p. 230)

[Proboscis obtusely conical at tip (blunt in *carvalhoi*); chelae not so spinose as *carvalhoi*, but tibia more so (Brazil to 5° S.) ..... *stictus* Marcus]

10. Cephalic segment overhanging proboscis by at least half its length; with minute auxiliary claws 11

Cephalic segment short, little beyond base of proboscis; without auxiliary claws ..... **pygmaeus** (p. 224)

[Cephalic segment slightly longer; scape of chelifore slightly expanded distally (southern Brazil) *brasiliensis*, new name pro *pygmaeus* Marcus]

11. With low tubercles on lateral processes and first coxae; a few long setae on legs ..... **petiolatus** (p. 222)

Tubercles absent or inconspicuous; legs without setae or with very few. **parvus** (p. 223)

12. Processes on scape of chelifore overhanging insertion of chelae; conical processes on dorsodistal ends of femur and tibiae ..... **insignis** (p. 226)

Scape without overhanging process; processes on femur rounded, lacking or inconspicuous on tibiae ..... **polignaci** (p. 230)

ANOPLODACTYLUS PETIOLATUS (Krøyer)

FIGURE 27, *a–d*

Phoxichilidium petiolatum KRØYER, 1844, p. 123.
Anoplodactylus petiolatus SARS, 1891, pp. 25–29, pl. 2, fig. 2, *a–1*.
Anaphia petiolata LEBOUR, 1916, pp. 51–56, figs. 1–3.
Anoplodactylus petiolatus TIMMERMANN, 1932, p. 327, fig. 3.—MARCUS, 1940b, pp. 61–62, fig. 5, *a*, *b*.—LEBOUR, 1945, pp. 157–159, fig. 6, *a–h*.

RECORDS OF COLLECTION

Albatross station 2307, Oct. 21, 1884, lat. 35°42′00″ N., long. 74°54′30″ W., 43 fathoms, 5 specimens.

St. Joseph Island, Tex., from sargassum cast on beach, April 16, 1946, J. W. Hedgpeth coll., 12 specimens (including ovigerous males).

The females of the Texas specimens are almost glabrous; the males are slightly spinose. Although the lateral processes of the *Albatross* specimens (used in preparing the figure) are more widely separated than seems characteristic for this species, they are otherwise inseparable from *A. petiolatus*.

Distribution.—Anoplodactylus petiolatus is widely distributed along the European coast from Norway (about lat. 69° N.) to the Mediterranean and in the Sargasso Sea; in Santos Bay, Brazil, and the Beagle Channel (Tierra del Fuego) and on the coast of southern Chile. These southern records may not be of the same species. As Marcus (1940b, pp. 41–42) has shown, the widely published record of Alaska for this species is based on Norman's (1908, p. 202) error in misinterpreting a comparative table of differences between *A. petiolatus* and *A. erectus* Cole in Cole's (1904a) paper on California and Alaskan pycnogonids. It has not yet been collected in North Pacific waters.

ANOPLODACTYLUS PARVUS Giltay

FIGURE 27, *e*, *f*

Anoplodactylus parvus GILTAY, 1934, pp. 1–3, figs. 1–5.

Fish Hawk records.—Station 8826, July 8, 1920, Chesapeake Bay, off Plantation Point, 45.75 fathoms, 1 male; station 8887, October 19, 1920, Chesapeake Bay off Rappahannock Spit, 12.81 fathoms, 1 male.

The principal differences between this species and *A. petiolatus* are its smaller size, reduction of tubercles on the lateral processes, and comparatively fewer spines on the legs. Both species have tubular cement glands of the same type, and may prove to be the same. Timmermann (1932, p. 327) comments on the small size of his speci-

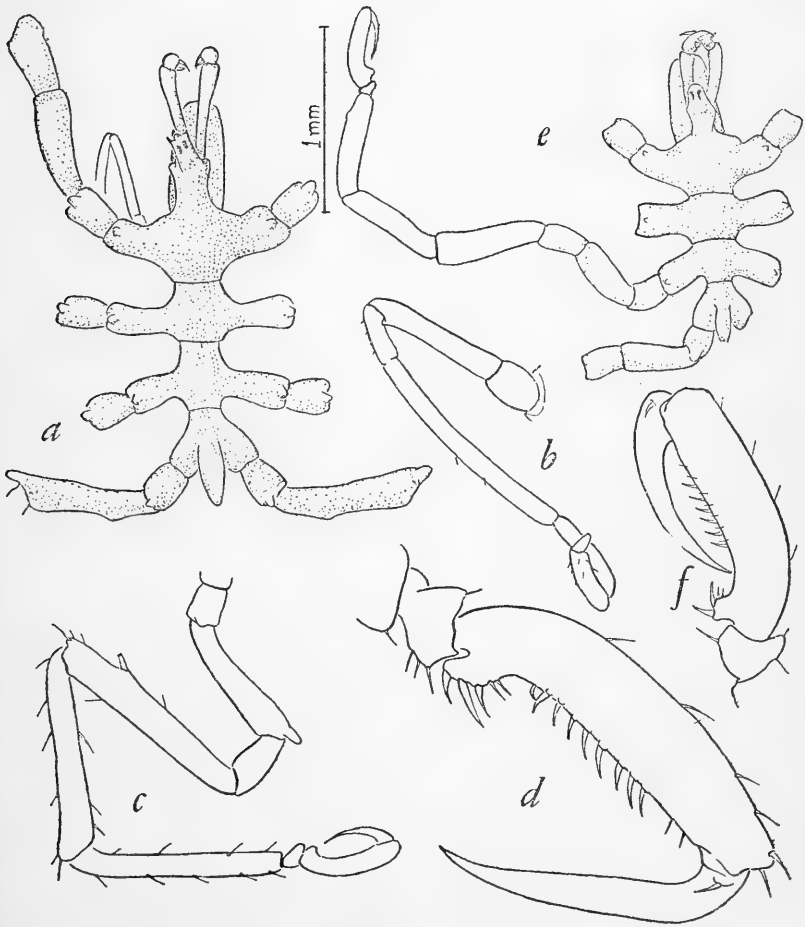

FIGURE 27.—*a–d*, *Anoplodactylus petiolatus* (Krøyer); *e*, *f*, *A. parvus* Giltay.

mens of *A. petiolatus* taken from the sargassum, and it is possible that his collections represent an intermediate form, if not this form, which was described by Giltay from Bermuda.

ANOPLODACTYLUS PYGMAEUS (Hodge)

FIGURE 27A

Pallene pygmaea HODGE, 1864, p. 116, pl. 13, figs. 16, 17.
Phoxichilidium exiguum DOHRN, 1881, p. 181, pl. 12, figs. 19–22.
Nec *Anoplodactylus pygmaeus* MARCUS, 1940b, pp 63–64, pl. 6, fig. 6*a–d*.
Anoplodactylus pygmaeus LEBOUR, 1945, pp. 159–162, fig. 7*a–l*.

RECORDS OF COLLECTIONS

Norfolk, Va., August 8, 1944, WHOI fouling collection, station E 16, 2 males (1 ov.), 1 female. Also 1 male, station E 17, same area and date.

Galveston, Tex., October 12, 1943, WHOI fouling collection, station I 25, several specimens including ovigerous males.

This minute species, which indicates, in the comparatively short cephalic segment, a transitional phase between *Anoplodactylus* and *Halosoma*, is evidently widely distributed. It may have been confused with *A. petiolatus* as a member of the sargassum fauna. As Lebour has shown, the species described by Marcus under this name is not the same, and for it I propose the new name *Anoplodactylus brasiliensis*. These specimens from Virginia and Texas agree, in the proportions of the joints of the ovigers, as well as in the presence of small tubercles on the lateral processes, with the European forms as described by Dohrn and Lebour. It is easily separable from *A. petiolatus* on the basis of the smaller size, presence of small spinose

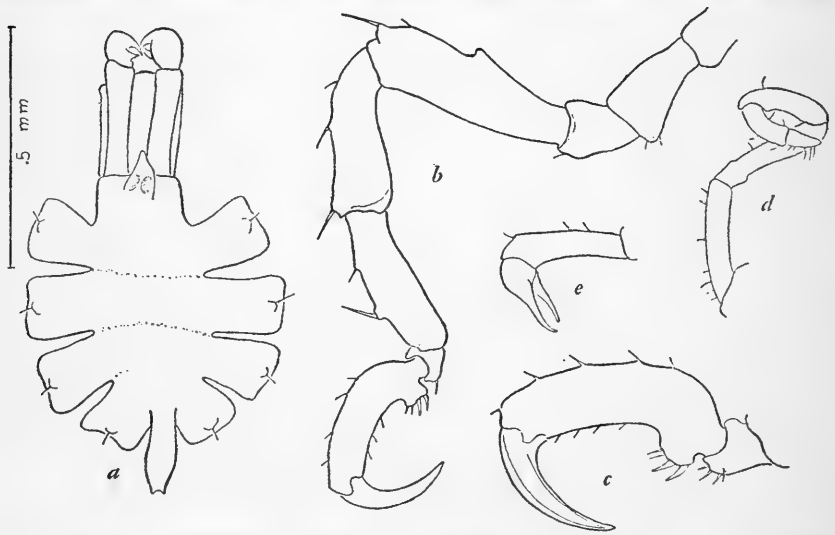

FIGURE 27A.—*Anaplodactylus pygmaeus* (Hodge): *a*, Dorsal view; *b*, leg; *c*, tarsus and propodus; *d*, oviger; *e*, chela.

tubercles, and the relatively short cephalic segment. In *petiolatus* the cephalic segment overhangs the proboscis. This is also the case with the Brazilian species described by Marcus, although the projection is shorter.

ANOPLODACTYLUS LENTUS Wilson

FIGURE 28, *a-c*

Anaphia pallida SAY, 1821, pp. 59–61, pl. 5, fig. 7.

Phoxichilidium maxillare VERRILL, 1873b, p. 250 (544), pl. 7, fig. 35.

Anoplodactylus lentus WILSON, 1878a, p. 200; 1878b, pp. 14–15, pl. 4, fig. 3, *a-c;* 1880, pp. 482–483, pl. 3, figs. 16–18.

Phoxichilidium maxillare MORGAN, 1891 (embryology).

Anoplodactylus lentus COLE, 1901, pp. 195–207 (habits); 1906b, pp. 740–741 (habits).

Anaphia lenta NORMAN, 1908, p. 204.

Anoplodactylus lentus SUMNER, OSBURN, and COLE, 1913, pp. 142–143, 677, chart 121 (distribution map).—FISH, 1925, p. 161.—DAWSON, 1934, pp. 62–68, pl. 1, figs. 1–17 (character of blood).—HEDGPETH, 1943b, p. 45.—NEEDLER, 1943, p. 14, fig. 17, *a-d.*

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2280	Oct. 19, 1884	35 21 00	75 21 30	16	1♀
2316	Jan. 15, 1885	24 25 30	81 47 45	50	1♂,1♀
2354	Jan. 22, 1885	20 59 30	86 23 45	130	1♀
2370	Feb. 7, 1885	29 18 15	85 32 10	25	1♂,2♀♀
2371	do	29 17 00	85 30 45	26	1♀
2372	do	29 15 30	85 29 30	27	1♂
2373	do	29 14 00	85 29 15	25	1♀
2375	do	29 10 00	85 31 00	30	2♀♀
2391	Mar. 4, 1885	29 32 00	87 45 00	25	1♂,1♀
2405	Mar. 15, 1885	28 45 00	85 02 00	30	1♀
2596	Oct. 17, 1885	35 08 30	75 10 00	49	5+

FISH HAWK RECORDS

1649	Jan. 16, 1891	Calibogue Sound, S. C.	7	25+
1651	do	do	10	5

ADDITIONAL RECORDS

Beaufort, N. C., Pivers Island, Laboratory Wharf, Nov. 2, 1927, J. S. Gutsell coll., 2 females.

Beaufort, N. C., June 1942, R. A. McLean coll., 1 male (ov.).

Folly River, S. C., Apr. 24, 1935, 2–3 fathoms, sand and mud, 5 specimens (including ovigerous males).

Tybee Island, Ga., 1888, 1 female, dried mounted in box (A.M.N.H.).

Tortugas, Fla., April 1904, C. H. Edmondson coll., 3 specimens.

South of Tortugas, Fla., June 10, 1925, W. L. Schmitt coll., 3 females, "prune purple."

Pelican station 169–7, lat. 28°24.5′N., long. 80°03′W., Jan. 18, 1940, 45 fathoms, try net, 2 males.

Also 300+ specimens from Woods Hole, Mass., and vicinity, various dates.

The characteristic features of this species are the lack of tubercles or processes on the lateral processes and legs, lack of noticeable spines on the body or legs, and the simple slitlike femoral cement gland of the male. There are no ventral growths on the proboscis of the female. Some specimens, particularly those from the Caribbean, are quite large, with an extent of at least 3 inches (7.5 cm.), while those found at Woods Hole and on the South Carolina coast are about half that size. A specimen intermediate in size was taken off Yucatán (*Albatross* station 2354). The distribution of these two forms is indicated by different symbols in figure 26. Some of the large Caribbean specimens are deep purple in color in life, as are many of the smaller Woods Hole specimens.

Wilson (1880, p. 483) lists a specimen from Eastport, Maine, and in the National Museum collection there is a single specimen labeled "Casco Bay, 1873." Both of these records may be errors in labeling; at any rate, *A. lentus* is rare north of Cape Cod. Its abundance at Calibogue Sound, not far from Charleston, suggests that Say's *Anaphia pallida* is the same species, inasmuch as Charleston was the type locality of Say's species.

The breeding season of *A. lentus* at Woods Hole is August (Cole, 1901); ovigerous males were taken in June at Beaufort, N. C., and in April from Calibogue Sound. None of the Caribbean specimens are ovigerous.

Dawson has described the colored corpuscles in the blood of this species in some detail. The coloring matter is neither hemoglobin nor hemerythrin, and may have some respiratory function.

ANOPLODACTYLUS INSIGNIS (Hoek)

FIGURE 28, *d-g*

Phoxichilidium insigne HOEK, 1881, pp. 82–84, pl. 14, figs. 5–7 [? p. 107, pl. 16, fig. 18].

Anoplodactylus insignis bermudensis COLE, 1904b, pp. 325–327, pl. 20, figs. 1–3; pl. 22, figs. 21–29.

Anoplodactylus insignis MARCUS, 1940b, pp. 58–60.

Anoplodactylus insignis bermudensis MARCUS, 1940b, p. 40.

Anoplodactylus insignis HEDGPETH, 1943b, p. 45.

FISH HAWK RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
7148	Nov. 6, 1901	29 48 10	83 55 15	5	1♂ (ov.)
7201	Dec. 6, 1901	29 32 30	83 50 00	9	1♂
7288	Feb. 24, 1902	24 42 50	81 53 38	7	1♂
7293	Feb. 24, 1902	24 42 30	81 55 52	7¼	1♂
7351	Dec. 17, 1902	25 09 45	81 18 35	3¼	1♀

ADDITIONAL RECORDS

Albatross station 2269, lat. 35°12′30″ N., long. 75°05′00″ W., Oct. 19, 1884, 48 fathoms, 2 females.

Tortugas, Fla., June 1908, 8–10 fathoms, among Bryozoa, R. C. Osburn coll., 1 female.

One-half mile off east end of Sanibel Island, Fla., Apr. 6, 1933, 6–15 feet, 2 females.

One mile off Sanibel Island, Fla., Apr. 10, 1933, 24–27 feet, 1 female.

Pelican station 169–7, lat. 28°24.5′ N., long. 80°03′W., Jan. 18, 1940, 45 fathoms, try net, 4 females.

Thetis Expedition station 10, three-eighths mile northwest by west of North Anclote Channel, Fla., November 17, 1941, sand bottom, 3 fathoms, 1 female (AMNH).

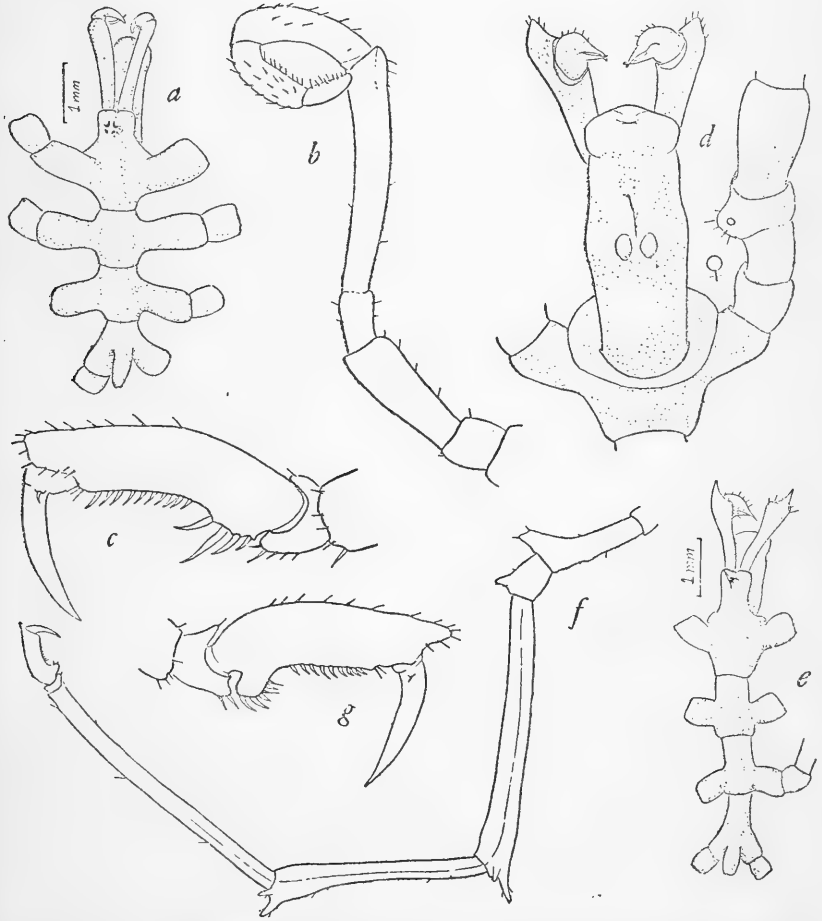

FIGURE 28.—*a–c*, *Anoplodactylus lentus* Wilson: *a*, Dorsal view of trunk; *b*, oviger; *c*, tarsus and propodus; *d–g*, *A. insignis* (Hoek): *d*, ventral view of anterior part of female; *e*, dorsal view of trunk; *f*, leg (female); *g*, tarsus and propodus.

Cole's variety *bermudensis* of this species was proposed for specimens which differed from Hoek's description in that they lacked lateroventral tubercles on the femur, were indistinctly segmented between the third and fourth trunk segments, and had cribriform cement glands. I have reexamined these Bermuda specimens and find that they fall within the wide range of variation for this plastic species. In some of the Florida region material, notably the female from Tortugas and the male collected at *Fish Hawk* station 7201, these femoral protuberances are identical with those illustrated by Hoek (pl. 14, fig. 5), but in another specimen (*Fish Hawk* station 7148) they are very low, and they are lacking in the other specimens. On none of the material could I find anything like the gland elaborately illustrated by Hoek (pl. 16, fig. 18), and no such gland is mentioned in his formal description of the species. Reference to it is made in a later section of his paper, in which he refers to the cement gland of this species as a "single pore at the end of the joint, placed at the tip of a conical excrescence." Reference of this structure to *A. insignis* is clearly a *lapsus calami;* there is nothing in Hoek's description of *Phoxichilidium insigne* or in the figures to indicate the presence of such a "conical excrescence." My suspicions have been confirmed by Dr. Isabella Gordon, who examined the *Challenger* type for me and found an open cribriform structure on the femur, of the type encountered in all the males from these collections.

Some of the female specimens have a completely segmented trunk. The ventral processes on the proboscis of the female are very variable, in some they are entirely lacking, in others they are quite prominent, resembling a pair of cones, projected forward. An intermediate condition is represented in figure 28, *d*. The blunt condition of the eye tubercle described by Hoek was probably a result of the same rough treatment which deprived his specimen of three of its legs; in most of these specimens the tubercle is pointed.

The genital protuberances of the female are relatively low and broad, with pores on all of them. In some of the male specimens these protuberances are very long, but apparently functional only in the last two pairs of legs.

The cribriform gland opening is a narrow ellipse with a longitudinal dividing septum.

In size the specimens vary from 25 to 40 mm. in extent.

Distribution.—Bahia, Brazil, to Bermuda, off Cape Hatteras, Tortugas, and western Florida.

ANOPLODACTYLUS TYPHLOPS Sars

FIGURE 29, *a-c*

Anoplodactylus typhlops SARS, 1888, No. 6; 1891, pp. 29–31, pl. 2, fig. 3, *a-c*.—CARPENTER, 1905, p. 5, pl. 3, figs. 12–19.—STEPHENSEN, 1935, pp. 29–30.

Record of collection.—Tortugas, Fla., 582 (?) fathoms, July 30, 1932, W. L. Schmitt coll., 1 female.

This species has been reported from Norway (near Trondheimfjord) and off Achill Head, Ireland. The latter record is a deep pelagic tow. The origin of the ovigers is well out on the lateral processes of the cephalic segment. *Anoplodactylus neglectus* Hoek (1898, pp. 293–295) is very similar to this species and would probably be considered identical with it had it not been collected in the sub-Antarctic between Prince Edward Island and Crozet Island.

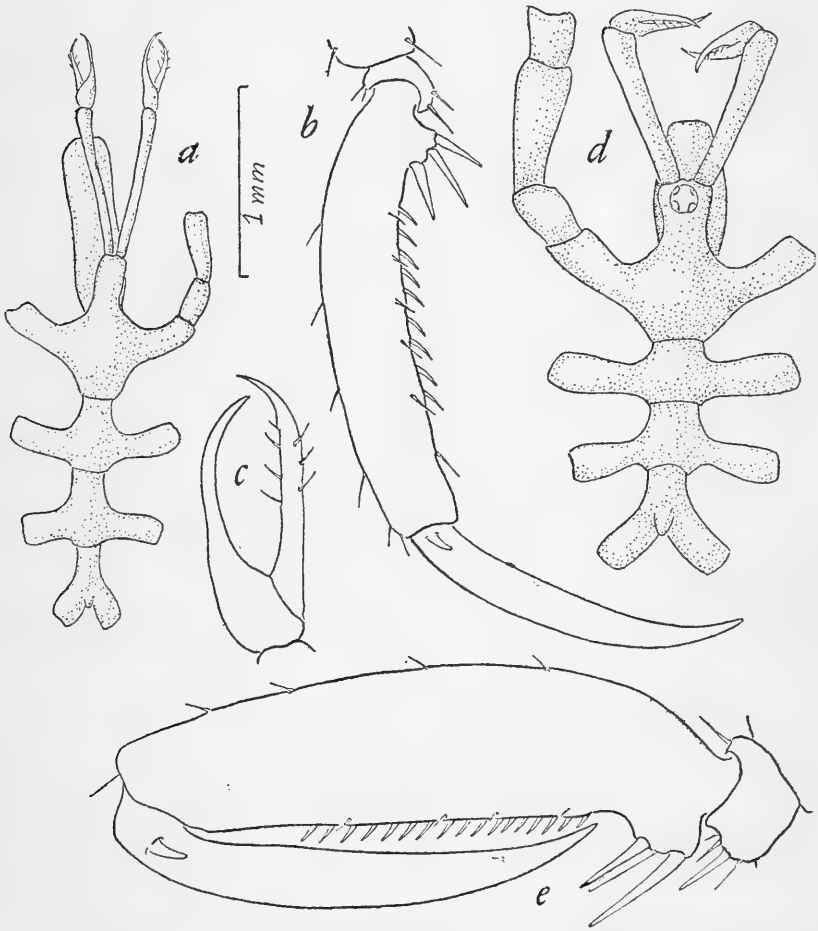

FIGURE 29.—*a–c*, *Anoplodactylus typhlops* Sars; *d*, *e*, ? *A. maritimus* Hodgson.

? ANOPLODACTYLUS MARITIMUS Hodgson

FIGURE 29, *d*, *e*

Anoplodactylus maritimus HODGSON, 1914, p. 164; 1915, p. 148.
Anoplodactylos maritimus HODGSON, 1927, p. 357.
Anoplodactylus maritimus MARCUS, 1940b, p. 60.

Record of collection.—Off Habana, Cuba, State University of Iowa Bahamas Expedition, 1893. 1 female.

Hodgson's regrettable eagerness to establish the priority of his names has deprived us of an adequate description of this species, and the reference of this specimen to *A. maritimus* is little more than a guess. The principal points of his hazy descriptions are the truncate eye tubercle, the lateral processes "scarcely so much as widely separated," and two or three large spines on the heel of the propodus. This specimen does not disagree with that description. Marcus suggests that *A. maritimus* may be related to *A. insignis* and *A. polignaci*, but it is hard to imagine that the existence of prominent processes on the legs (as possessed by these two species) would pass unnoted.

It is possible that *A. maritimus* may be the same as *A. pelagicus* Flynn (1928, pp. 25–27, fig. 14), which was collected off South Africa in a surface tow. Except for its more robust appearance, the specimen before me is very close to *A. pelagicus*. Unfortunately this is a female specimen and cannot certainly be referred to any known species or designated as the type of a new species. The tibial joints are not spiny as in *A. pelagicus*, however.

ANOPLODACTYLUS POLIGNACI Bouvier

FIGURE 30, *a–d*

Anoplodactylus polignaci BOUVIER, 1914a, pp. 223–226.—HEDGPETH, 1943b, pp. 45–46.

A single male specimen was taken by the *Bache* off Sombrero Key, Fla., in 1872. The femoral cement gland, which was not described by Bouvier, is of the cribriform type, located on a raised eminence. It has a conspicuous, raised, transparent rim.

ANOPLODACTYLUS CARVALHOI Marcus

FIGURE 30, *e–g*

Anoplodactylus carvalhoi MARCUS, 1940b, pp. 50–54, fig. 3, *a–k*.—HEDGPETH, 1943b, p. 46.

Record of collections.—Smithsonian-Hartford Expedition station 37, St. Croix, Virgin Islands, Salt River Lagoon, from mangrove roots, Apr. 10, 1937, Kai Essman and W. L. Schmitt colls., 8 males and 5 females.

Previously reported from the coast of southern Brazil. The processes on the ventral surface of the female proboscis are elaborate

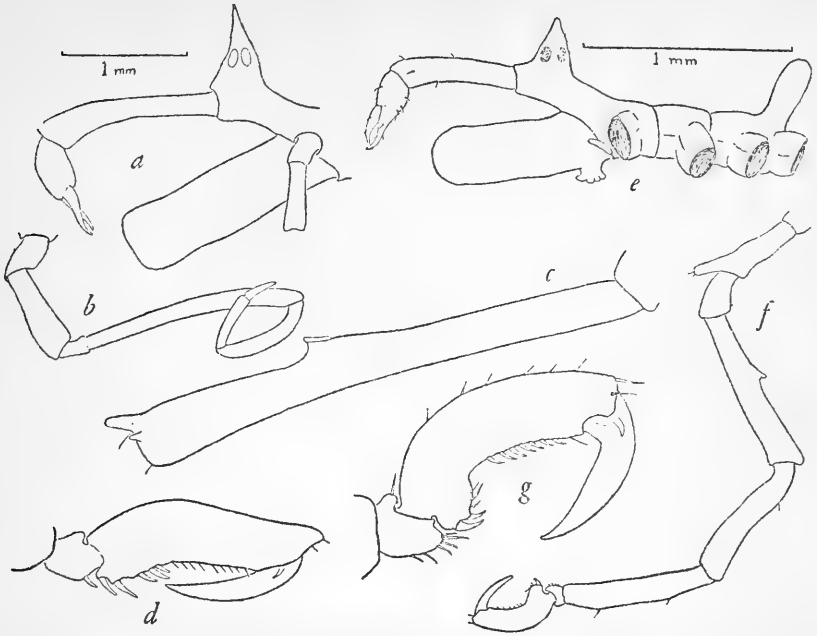

FIGURE 30.—*a–d*, *Anoplodactylus polignaci* Bouvier: *a*, Lateral view of cephalic segment; *b*, oviger; *c*, femur; *d*, tarsus and propodus. *e–g*, *A. carvalhoi* Marcus: *e*, Lateral view of female; *f*, third leg of male; *g*, tarsus and propodus.

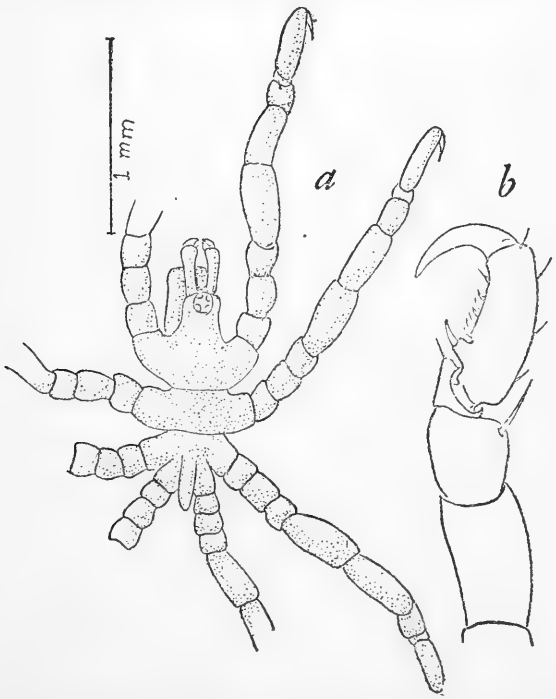

FIGURE 31.—*Anoplodactylus evelinae* Marcus: *a*, Dorsal view; *b*, terminal joints of leg.

lobed structures, and in addition there are fingerlike processes near the base of the proboscis which appear to be rudimentary palpi. These structures are also found in the males. The legs are rather short and the femur and tibiae are subequal. The cement gland opening of the male is a short transparent tube or vesicle on a slight elevation. These preserved specimens are green in color, like those of *Endeis spinosa;* according to Marcus the live animals have rose-red markings on various parts of the trunk and extremities.

ANOPLODACTYLUS EVELINAE Marcus

FIGURE 31

Anoplodactylus evelinae MARCUS, 1940b, pp. 55–58, fig. 4, *a–h.*

Record of collections.—Loggerhead Key, Tortugas, Fla., July 20, 1926, washed from seaweed and sand, shallow water, C. R. Shoemaker coll., 1 female; same, Aug. 13, 1926, from rocks and algae, 1 male.

This curious little pycnogonid was found by Marcus in Santos Bay and Rio de Janeiro Bay. Marcus comments on the doubtful generic status of this species. Giltay (in MS.) proposed the generic name *Labidodactylus* for it, and if future collections demonstrate its right to independence from *Anoplodactylus,* his name might be used.

ANOPLODACTYLUS QUADRATISPINOSUS Hedgpeth

FIGURE 32

Anoplodactylus quadratispinosus HEDGPETH, 1943b, pp. 47–48, pl. 8, figs. *a–g.*

This species is known from a single male specimen collected by Count Pourtalès near Key West in 1869. The square spines on the sole of the propodus are a ready character for identification.

ANOPLODACTYLUS STYLIROSTRIS, new species

FIGURE 33

Types.—Holotype (female): U.S.N.M. No. 81094, off southeast end of Loggerhead Key, Tortugas, Fla., August 9, 1926, about 10 feet, C. R. Shoemaker coll. Paratypes (2 males, 1 ov.): WHOI fouling collection, station G 23, Key West, Fla., August 29, 1943.

Bahamas: September 3, 1943. WHOI fouling collections, station J 6, 1 male (ov).

Description.—Trunk relatively compact, for the genus, lateral processes separated by slightly less than their own diameter. Eye tubercle rounded, about as wide as high, eyes large.

Proboscis styliform, pointed downward and usually not apparent from above. It tapers evenly to a blunt tip.

Abdomen slightly elliptical, about twice as long as the last lateral process.

Chelifore: Scape about as long as distance between eye tubercle and

first lateral process, slightly swollen distally. Chelae small, fingers bowed, opposing at tips.

Leg: Sparsely armed with long setae in male, females with fewer or no spines. Femur of female with slight constriction near middle, male with a moderately prominent distal projection bearing a large spine.

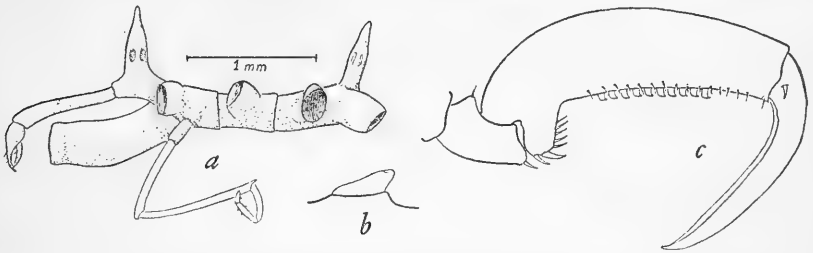

FIGURE 32.—*Anoplodactylus quadratispinosus* Hedgpeth: *a*, Lateral view; *b*, femoral cement gland; *c*, tarsus and propodus.

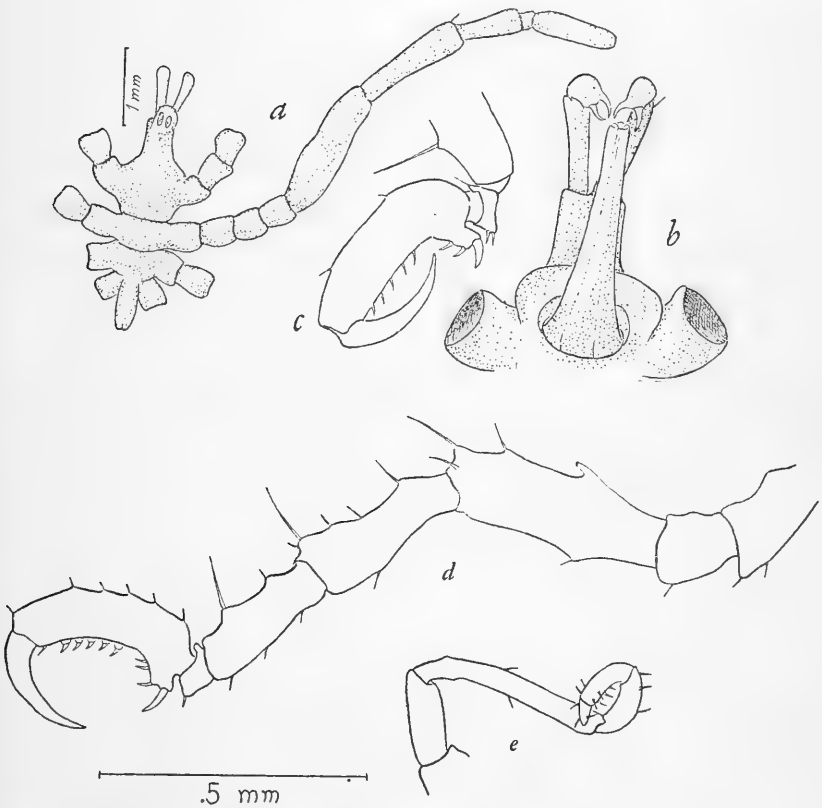

FIGURE 33.—*Anoplodactylus stylirostris*, new species: *a*, Dorsal view of holotype; *b*, ventral view of proboscis and chelifores; *c*, tarsus and propodus; *d*. third leg of male; *e*, oviger.

Cement gland a short narrowly conical tube at an acute angle near middle of femur. Second tibia half or two-thirds as long as first. Tarsus very short, angular, with one or two basal spines. Propodus curved, with a prominent heel, bearing a stout basal spine and two or three shorter spines on its inner margin. Sole with several broad blunt spines. Terminal claw four-fifths as long as propodus; auxiliary claws not apparent.

Oviger: Fourth segment three times as long as fifth and twice as long as second, slightly curved at basal fourth, with a slight swelling near base. Terminal segments sparsely armed with setae.

Measurements (paratype) as follows:

	Mm.	Third leg:	*Mm.*
Proboscis	0. 5	Coxae	0. 4
Diameter at base	0. 2	Femur	0. 4
Trunk	0. 75	First tibia	0. 3
Cephalic segment	0. 35	Second tibia	0. 25
Second lateral process, width	0. 35	Tarsus	0. 05
Abdomen	0. 15	Propodus	0. 3
		Terminal claw	0. 2

Remarks.—This species resembles *Anoplodactylus intermedius* Hilton (1942d, pp. 44–45) from Hawaii in its styliform proboscis. It may possibly be the same species, although Dr. Elwood C. Zimmerman, who examined the Hawaiian type for me and compared it with drawings of this form, is of the opinion that they are distinct. The abdomen of this species appears to be about half as long as that of *A. intermedius*, and the eyes are indistinct or lacking in the Hawaiian form, according to Hilton. The styliform proboscis is a curious aberration in a genus in which so many of the females have ventral outgrowths on the proboscis.

ANOPLODACTYLUS PECTINUS, new species

FIGURE 34

Types.—Holotype (male): U.S.N.M. No. 81095, 5 miles south of Loggerhead Key, Tortugas, Fla., July 20, 1924, 7–10 fathoms, W. L. Schmitt coll. Paratype (male): U.S.N.M. No. 81096, off north end of Loggerhead Key, Tortugas, Fla., Aug. 4, 1926, from old rocks and algae, 15 feet, C. R. Shoemaker coll.

Description.—Trunk slender, lateral processes separated by as much as their own diameter. Eye tubercle erect, rounded. Eyes large, near top of tubercle, distinct but lightly pigmented.

Proboscis short, subcylindrical, constricted slightly near the tip.

Chelifore: Scape very slender, sticklike, with a few setae along the outside. Chelae small, fingers slender, bowed, crossing near the tip, without teeth or spinules.

Oviger: Six-jointed, with a nonarticulated segmentation near base of the third segment. Relatively few spines on the terminal joints.

Leg: Slender, free of knobs, tubercles, or prominent setae, except for a low rounded knob at the dorsodistal end of the femur. Femoral cement gland of the cribriform type, at the middle of the joint, depressed and with a transparent rim. Femur and tibiae subequal. Tarsus small; propodus curved but without a prominent heel. There are two basal spines, one simple, the other with denticulations on the inner margin, which give it the appearance of a minute comb. Ventral margin (sole) of propodus with 10 or 11 spines. Terminal claw nearly as long as propodus, almost straight. Auxiliary claws not apparent; if present, they are very small.

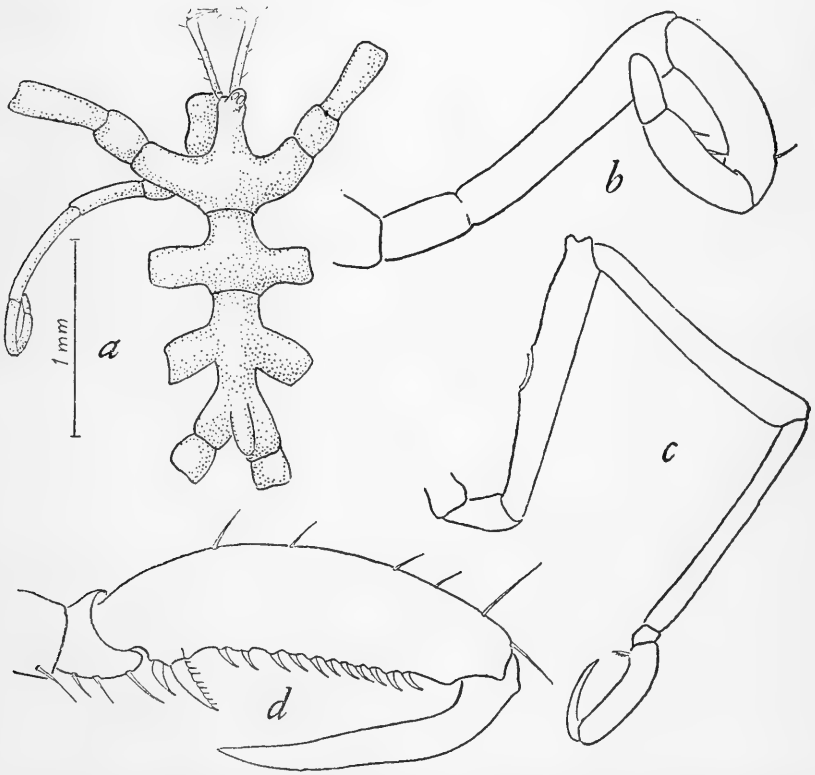

FIGURE 34.—*Anoplodactylus pectinus*, new species: *a*, Dorsal view of holotype; *b*, oviger; *c*, leg; *d*, tarsus and propodus.

Measurements.—As follows:

Proboscis:	*Mm.*	Third leg:	*Mm.*
Length	0. 5	Coxae	0. 5
Diameter	0. 25	Femur	1. 4
Trunk	1. 9	First tibia	1. 3
Cephalic segment	0. 6	Second tibia	1. 25
Second lateral process, width	0. 8	Tarsus	0. 08
Abdomen	0. 25	Propodus	0. 5
		Terminal claw	0. 3

Remarks.—Except for the curious denticulate spine at the base of the propodus and the cribriform type of gland opening, this species resembles *A. pelagicus* Flynn (1928, pp. 25–27), especially in the very slender scape of the chelifore.

ANOPLODACTYLUS sp. A

FIGURE 35

Record of collection.—Loggerhead Key, Tortugas, Fla., August 8, 1930, 10 fathoms, many seaweeds, W. L. Schmitt coll., 1 male (incomplete).

Unfortunately this specimen is without a complete leg, so the structure of the tarsal joints cannot be described. This is probably an undescribed species; the very long and slender tubular gland duct near the distal end of the femur has not been mentioned in other species of the genus. The eye tubercle is tall and erect. The trunk is apparently unsegmented and the integument is very transparent. It is possible that this is a recently molted specimen, but the development of the oviger and femoral gland indicates that it is almost if not quite mature.

ANOPLODACTYLUS sp. B

FIGURE 36

Record of collection.—*Pelican* station 169–7, Jan. 18, 1940, lat. 28°24.5′ N., long. 80°03′ W., 45 fathoms, try net, 1 female.

If not the same species, this specimen is closely related to *Anoplodactylus massiliensis* Bouvier (1916a, 1937). It differs from Bouvier's specimen (also a female), dredged in the Mediterranean off Marseilles, in the following details:

1. The spur on the propodus is about half as long.
2. The eye tubercle is blunt instead of sharply pointed, and there is no evidence of injury.
3. The genital protuberances are very low.
4. The lateral processes are not so widely separated.

Clarification of the status of this specimen must await the collection of males from both sides of the Atlantic. *A. massiliensis* may have as wide a range of variation as *A. insignis;* in fact, such individual variation appears to be the rule in this genus. But the shape and spiny armature of the propodus usually form the most constant feature of the species of *Anoplodactylus*, and the short spur of the

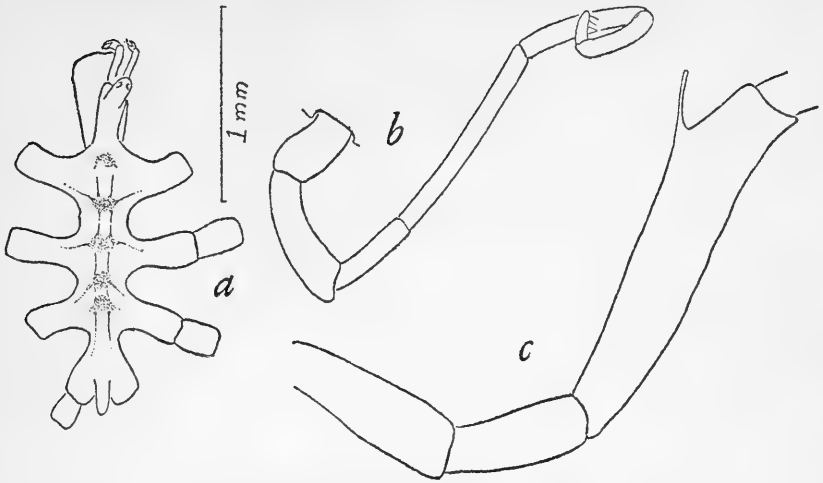

FIGURE 35.—*Anoplodactylus* sp. A: *a*, Dorsal view; *b*, oviger; *c*, femur.

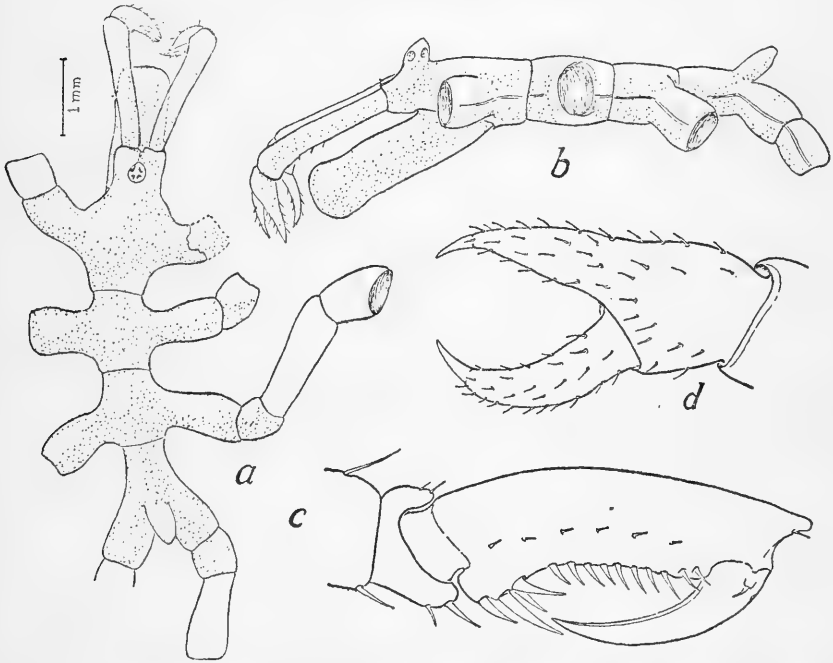

FIGURE 36.—*Anoplodactylus* sp. B: *a*, Dorsal view of female; *b*, lateral view; *c*, tarsus and propodus; *d*, chela.

propodus may separate this specimen from Bouvier's species. Bouvier's figure (1923, fig. 34) is somewhat stylized, and the differences may be more apparent than real. The structure of the chelae is different from those of the other species found in the Caribbean region; the fingers are conspicuously longer than the "palm" or basal part, and the tips are without spines (fig. 36, *d*).

There is only one entire leg on the specimen. It is without knobs, prominent spines, or other notable features, and has the following measurements:

	Mm.		*Mm.*
First coxa	0. 5	Femur	6. 0
Second coxa	1. 25	First tibia	5. 5
Third coxa	0. 6	Second tibia	9. 0
Tarsus and propodus	1. 5		

Family ENDEIDAE Norman, 1908

This family is characterized by the absence of chelifores and palpi, and the presence of ovigers only in the male. The ovigers are 7-jointed. The legs are long, terminating in a well-developed propodus with auxiliary claws. The only known genus is *Endeis*.

Genus ENDEIS Philippi, 1843

(*Phoxichilus* auct. nec Latreille)

Chilophoxus Stebbing, 1902, p. 188.
Endeis Norman, 1908, pp. 231–233.—Cole, 1910, p. 194.—Calman, 1915a, pp. 48–49.—Marcus, 1940b, pp. 71–72.

The unhappy history of this generic name is marked by several impassioned polemics and much spilling of ink (see Pallenidae). As can be seen from the incomplete synonymy given below for *Endeis spinosa*, the matter is still unsettled. This is unfortunate in view of the wide distribution and ecological interest of this species. It seems too much to hope that future specialists will agree on the matter. Marcus is the first to notice that the name *Endeis* requires feminine endings for its species.

Endeis is represented in the northwestern Atlantic by one species, *E. spinosa*, but inasmuch as *E. charybdaea* has been found on the coast of Brazil, it may also be expected in the Caribbean. The only reliable character on which both sexes of the two species may be separated is the larger size of *E. charybdaea;* the length of the body, exclusive of the proboscis, is 8–10 mm., whereas the body of *E. spinosa* is never more than 6.5 mm. in length and is usually less. At best this is an empirical distinction, and *E. charybdaea* seems to be an uncertain species.

ENDEIS SPINOSA (Montagu)

Figure 37

Phallangium spinosum Montagu, 1808, p. 100, pl. 5, fig. 7.
Phoxichilus vulgaris Dohrn, 1881, pp. 169–174, pls. 10, 11.
Phoxichilus spinosus Sars, 1891, pp. 15–20, pl. 1, fig. 3, *a–g*.
Endeis spinosus Norman, 1908, p. 233 (synonymy).—Cole, 1910, pp. 193–203, figs. 1, 2.—Sumner, Osburn, and Cole, 1913, p. 143.
Phoxichilus spinosus Bouvier, 1917, pp. 30–31, pl. 2, fig. 2.
Chilophoxus spinosus Bouvier, 1923, pp. 45–46, figs. 42, 43.—Timmermann, 1932, pp. 327, 333.

Phoxichilus spinosus STEPHENSEN, 1935, p. 30.
Chilophoxus spinosus GILTAY, 1937, p. 89.
Endeis spinosa MARCUS, 1940b, pp. 73–75, fig. 9, *a–e.*—HEDGPETH, 1943b, p. 48.

RECORDS OF COLLECTIONS

Bermuda, 1877. G. Brown Goode coll., 1 female (Y. P. M.).

Bermuda, north shore of St. George Island, June 9, 1936, F. A. Chace, Jr., coll., 1 female (M. C. Z.).

Bermuda, H. Pratt coll., 1 female.

Bermuda, from sargassum, on hydroids, March 17, 1917, W. J. Crozier coll., 1 male, 1 female.

Bermuda, Nonsuch Wharf, Aug. 10, 1937, William Beebe coll., 1 female.

Fish Hawk station 8841, Aug. 22, 1920, off Plantation Point, Chesapeake Bay, 12.8 fathoms, 1 female.

Huntington Island Buoy, 11 miles off coast of South Carolina, March 7, 1935, T. B. Christiansen coll., 1 female.

Tortugas, Fla., June 20, 1905, surface tow, L. J. Cole coll., 1 female (olive-green and light yellow-green).

Tortugas, Fla., Apr. 15, 1906, surface, Gulf Stream, L. J. Cole coll., 1 female.

Tortugas, Fla., Apr. 22, 1906, surface tow, L. J. Cole coll., 1 female.

Tortugas, Fla., May 9, 1906, in floating gulf weed, L. J. Cole coll., 1 male (ov.), 1 female.

Tortugas, Fla., June 5, 1906, 5 fathoms, L. J. Cole coll., fragments.

Loggerhead Key, Fla., northwest of lighthouse, Aug. 4, 1924; 5–10 feet, W. L. Schmitt coll., 1 female.

Shoals north of Loggerhead Key, Tortugas, Fla., 1924, 10–48 feet, W. L. Schmitt coll., 1 female.

North end of Loggerhead Key, Tortugas, Fla., July 14, 1925, W. L. Schmitt coll., 1 male.

Tortugas, Fla., July 28, 1926, from live car under wharf, C. R. Shoemaker coll., 1 male, 1 juv.

Tortugas, Fla., Aug. 18, 1926, from rope hanging in water near wharf, C. R. Shoemaker coll. 5 females.

Johnson-Smithsonian Expedition, station 16, Feb. 3, 1933, north of Puerto Rico, lat. 18°31′ N., long. 66°10′15″ W., 38 fathoms, tangles, 1 male (with *Pentanymphon geayi* Bouvier).

Haiti, Mar. 25, 1927. [Identified from a water-color painting of an ovigerous male, forwarded by William Beebe; the specimen is lost or mislaid.]

Guayanilla Playa Wharf, Ensenada, Puerto Rico, June 25, 1915, on wharf piles 0–5 feet, R. W. Miner and R. C. Osburn colls., 1 male, 1 female.

These specimens vary in extent from 3+ cm. (Bermuda) to less than 8 mm. (Chesapeake Bay), but none of them are as large as *E. charybdaea*. The ovigerous male taken from floating sargassum at Tortugas is about 2.5 cm. in extent. According to Timmermann and Giltay, the specimens taken from sargassum in midocean are of the smaller variety, and the relatively large size of these pelagic specimens is of interest, suggesting that we are not dealing with physiological races or similar specific subdivisions, or at least that the differences are not correlated with habitat.

Distribution.—Sparingly along the European coast from Norway (about lat. 62°30′ N.) to France; in the Mediterranean and Black

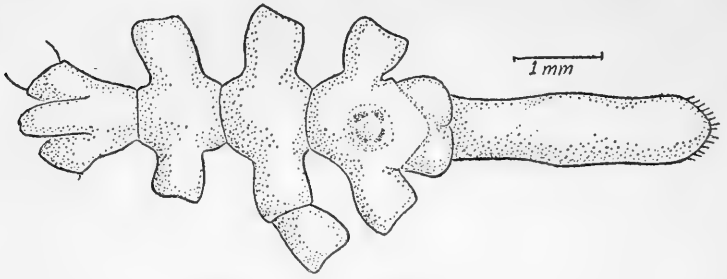

FIGURE 37.—*Endeis spinosa* (Montagu).

Seas (Crimea) and the Azores; Santos Bay and Rio de Janeiro, Brazil. On the North American coast it is apparently common in the Tortugas region. Its occurrence at Woods Hole is sporadic (Cole). The mid-Atlantic records are charted on figures 6 and 7 and will be found in Appendix Table 3. There is one doubtful record from Arctic waters (Schimkewitsch, 1891, p. 514). It is represented in the Woods Hole Oceanographic Institution fouling collections from Panama to Block Island, including the Bahamas, but it is not yet reported from Texas or Louisiana.

Family AMMOTHEIDAE Dohrn, 1881

A family of heterogeneous appearing forms, from the small compact species of *Achelia* to the large spectacular *Ascorhynchus armatus*. Ovigers are present in both sexes, 9- to 10-jointed. Chelifores and palpi present, chelae usually subchelate; palpi 6- to 10-jointed, usually 8- or 9-jointed. At least eight genera are represented in American waters, and the mysterious *Calypsopycnon* is also included in the key.

1. Palpi usually more than 7-jointed; chelifores shorter than proboscis, with small or rudimentary chelae 2
   Palpi 7-jointed; chelifores longer than proboscis, with large chelae opposed in front of mouth ..... **Paranymphon** (p. 253)
2. Propodus intermediate, i. e., without heel and large basal spines and auxiliary claws; proboscis conspicuously large, usually carried ventrally 3
   Propodus with basal spines and usually with auxiliary claws (except *Ephyrogymna*); proboscis not conspicuously large 6
3. Proboscis pyriform or cylindrical but not on a jointed petiole; without large spines on eye tubercle or abdomen 4
   Proboscis pyriform, on a jointed petiole; prominent spines on eye tubercle and abdomen ..... **Eurycyde** (p. 260)
4. Proboscis straight, cylindrical; chelae well developed 5
   Proboscis pyriform, carried ventrally, chelae small or rudimentary. **Ascorhynchus** (p. 253)
5. Scape 1-jointed, trumpet-shaped; terminal claws very long. **Calypsopycnon** (p. 263)
   Scape 2-jointed, chelae large, fingers bowed; terminal claws short. **Heterofragilia** (p. 262)
6. Tibiae without spiny tubercles; scape of chelifores not trumpet-shaped 7
   Tibiae with two rows of tall spinous tubercles; scape trumpet-shaped. **Nymphopsis** (p. 249)

7. Chelifores 3-jointed; trunk segmentation distinct.....8
   Chelifores 2-jointed; trunk segmentation usually suppressed.**Achelia** (p. 241)
8. Propodus intermediate; proboscis short, cylindrical....**Ephyrogymna** (p. 261)
   Propodus well developed; proboscis large, elliptical or pyriform.
   Ammothella (p. 246)

Genus ACHELIA Hodge, 1864

Chelifores 2-jointed, usually subchelate in the adult. Palpi 7- to 9-jointed, usually 8. Oviger 10-jointed, with leaflike denticulate spines but without a large terminal claw. Propodus well developed, with prominent auxiliary claws, but heel and basal spines lacking in some species. The trunk is usually compact and circular, but there are at least two species from deep water with elongate, segmented trunks.

In this genus are included the small forms without a completely segmented trunk which have been referred to *Ammothea* Leach, 1814 (=*Leionymphon* Möbius, 1902) by many authors, or to the subgenus *Achelia* of *Ammothea* by others (Giltay, 1934b). The principal distinction of *Ammothea*, aside from its larger size, is the presence of prominent annular swellings or ridges between the trunk segments. One reason for this confusion has been the apparent mistake in the type locality of *Ammothea carolinensis* Leach (1814, pp. 33–34). Leach believed that the specimens came from South Carolina and named them accordingly. Calman (1915b), in redescribing the holotype, suggested that this may have been an error for South Georgia. Except for dubious records, the genus *Ammothea* s. str. is known only from the Antarctic and sub-Antarctic regions.[23] The only species of pycnogonids so far known from the coast of South Carolina are *Anoplodactylus lentus*, *Endeis spinosa*, *Nymphopsis duodorsospinosa*, and *Tanystylum orbiculare*. *Ammothea carolinensis* has been frequently collected from South Georgia, and there is little doubt that Calman's suggestion is correct.

Helfer, in the Bronn's Tierreich Monograph (Helfer and Schlottke, 1935, p. 284) has confused the matter by first reducing *Achelia* to synonymy under *Ammothea*, then including the genotype of *Ammothea* under the name *Leionymphon* while at the same time recognizing *Ammothea* Leach. As Marcus (1940b, p. 69) has rather pointedly remarked, "Helfer did not comprehend the nomenclature of the Ammotheidae."

There are a number of dubious names, viz, *Alcinous* Costa, 1861, *Phanodemus* Costa, 1836, *Platychelus* Costa, 1861, *Oiceobathys* Hesse, 1867, and *Oomerus* Hesse, 1874, which may be congeneric with *Achelia*, but it seems wisest to forget them. The punctilious taxonomist who endeavors to resurrect such names will not be thanked for his pains.

[23] Loman (1929, p. 71) reports an immature *Ammothea* (*Leionymphon*) from the Atlantic coast of Morocco and Hilton (1943a, pp. 97–98) proposes a new species, *Leionymphon dorsiplicatum*, from the North Pacific.

Achelia is represented in the collections by five species, one of them (*A. brevichelifera*), diverging from the usual form in that the trunk is slender and the lateral processes are widely separated.

1. Lateral processes touching or narrowly separated, body circular 2
   Lateral processes separated by about their own width, body oval in outline ..... **brevichelifera**, new species (p. 245)
2. Heel of propodus with large basal spines; abdomen conspicuously longer than first coxa of fourth leg 3
   Heel of propodus without large basal spines; abdomen not longer than first coxa 4
3. Auxiliary claws at least half as long as terminal claw; lateral processes narrowly separated ..... **spinosa** (p. 242)
   Auxiliary claws less than one third as long as terminal claw; lateral processes contiguous ..... **scabra** (p. 244)
4. Palpus 7-jointed (penultimate twice as long as terminal joint ..... **gracilis** (p. 244)
   Palpus 8-jointed (four terminal joints small) ..... **sawayai** (p. 244)

ACHELIA SPINOSA (Stimpson) Wilson

FIGURE 38, *a*, *b*

Zetes spinosa STIMPSON, 1853, p. 37.
Achelia spinosa WILSON, 1878b, pp. 7–8, pl. 2, fig. 1, *a–h*.
Ammothea achelioides WILSON, 1878b, pp. 16–17, pl. 5, fig. 1, *a–e*.
Achelia spinosa WILSON, 1880, pp. 473–476, pl. 1, fig. 1; pl. 2, fig. 8.
Ammothea achelioides WILSON, 1880, pp. 484–485, pl. 4, figs. 19, 20.
Achelia spinosa WHITEAVES, 1901, p. 262.
Ammothea achelioides WHITEAVES, 1901, p. 203.
Ammothea echinata NORMAN, 1908, p. 224 (part).
Ammothea (*Achelia*) *echinata*? var. *spinosa* SCHIMKEWITSCH, 1930, pp. 133–136.
Ammothea spinosa NEEDLER, 1943, p. 16, fig. 20, *a–d*.

Record of collection.—St. Croix River between station toward Joes Point, St. Andrews, New Brunswick, August 1913 (dredging), R. W. Miner coll., 1 male (AMNH).

This species is not often collected; there is no material in the collections of the National Museum and the Peabody Museum collected since Wilson's day. Hence there is little to add to the range established by Wilson (1880), namely, from Long Island Sound (Block Island) to Eastport, Maine, and Grand Manan, except this New Brunswick record.

The spiny processes of the first coxal joints which are characteristic of this species vary somewhat in size and number. This variation is not correlated with sex. Dorsal tubercles on the lateral processes are developed in a few of the specimens, similar to those found in *A. scabra*, but they are shorter. The auxiliary claws are always long.

Norman and several later writers have suggested that *A. spinosa* is the same as *A. echinata* Hodge, 1864. If so, the name *spinosa* has priority over *echinata*. Wilson (1880) examined some specimens of *A. echinata* and summarized their differences from *spinosa* as follows: "[*A. echinata*] has a slender, tapering rostrum (proboscis) of a very different shape; the peculiar conical spinous tubercles

upon the legs are much more numerous, large and more slender; the abdomen is much shorter and stouter. Moreover, in *A. echinata* the second joint, in at least the two posterior pairs of legs, has a very prominent, rounded, hair tubercle, projecting from the lower and posterior side, which is wanting in our species." Reexamination of some of Wilson's material has revealed the presence of very low genital protuberances on the last two pairs of second coxae in the males of *spinosa*, but they are far from prominent. Until the larval development of the two species can be compared, this difference alone is enough to entitle them to separate names.

Hilton (1943a, pp. 94–95) lists *Ammothea echinata* from San Francisco Bay and Alaskan waters. This cannot be *Achelia spinosa*, since "two well developed suture lines" are mentioned; *A. spinosa* has an unsegmented trunk.

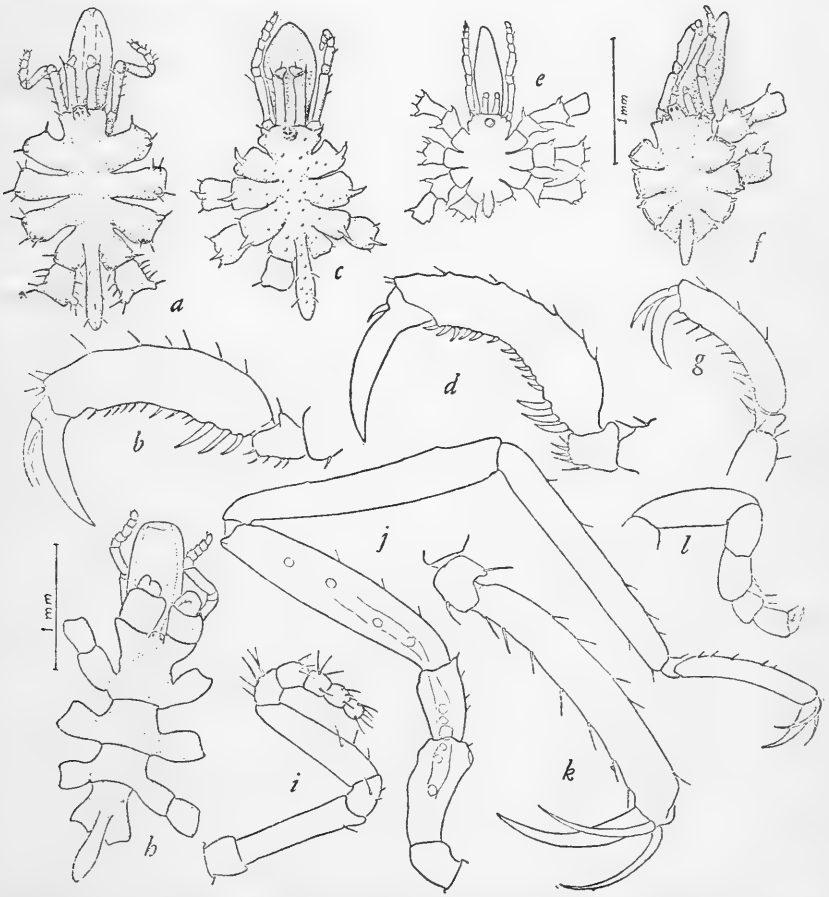

FIGURE 38.—*a*, *b*, *Achelia spinosa* (Stimpson) Wilson; *c*, *d*, *A. scabra* Wilson; *e*, *A. sawayai* Marcus; *f*, *g*, *A. gracilis* Verrill; *h–l*, *A. brevichelifera*, new species: *h*, Dorsal view of holotype; *i*, palpus; *j*, leg; *k*, tarsus and propodus; *l*, terminal joints of oviger.

Ammothea achelioides is an immature form of *A. spinosa* in which the chelifores are still chelate.

ACHELIA SCABRA Wilson

FIGURE 38, *c*, *d*

Achelia scabra WILSON, 1880, pp. 475–476.—GILTAY, 1942, p. 460.
Ammothea scabra NEEDLER, 1943, p. 16, fig. 21, *a–c*.

RECORDS OF COLLECTIONS

South of Cape Sable, Nova Scotia, Oct. 7, 1908, 45 fathoms, Owen Bryant coll., 2 females.

Off Grand Harbor, Grand Manan, August 1910, H. L. Clark and H. B. Bigelow colls., 1 male (M.C.Z.).

Wilson's description of this species is based on two specimens which he had previously mistaken for *A. spinosa*, a male from off Cape Ann and a female from St. Georges Bank. Two more females were found, in reexamining the material, in a vial identified as *A. spinosa*, from Casco Bay, 1873. Giltay's record (*Prince* station 43) extends the range of this species to the Gulf of St. Lawrence.

Achelia scabra differs from *A. spinosa* in the reduction of spiny tubercles on the first coxae, the presence of large tubercles on the posterior outer corners of the lateral processes, and the reduced length of the auxiliary claws. The specimen from Grand Manan has a few more spines on the first coxae than seem to be usual for this species. In none of the specimens of *spinosa* or *scabra* could I find auxiliary claws of transitional length.

ACHELIA GRACILIS Verrill

FIGURE 38, *f*, *g*

Achelia (?) *gracilis* VERRILL, 1900, p. 582, pl. 70, fig. 10.
Ammothea gracilis COLE, 1904b, pp. 317–323, pl. 21, figs. 4–14.
Ammothea (*Achelia*) *gracilis* GILTAY, 1934b, p. 5.
Achelia gracilis MARCUS, 1940b, p. 79.

Record of collection.—Bermuda, July 8, 1905, from *Pennaria*, 10 specimens.

Although Giltay gives the Bahamas as the further distribution of this species, there is no material in the museum collections from that region. Giltay's record may be founded on unreported material in the Belgian Museum or on National Museum material which has since been mislaid. It is evidently common at Bermuda and is represented in the Woods Hole Oceanographic Institution fouling collections from station G12, Port Everglades, Fla., August 16, 1943.

ACHELIA SAWAYAI Marcus

FIGURE 38, *e*

Achelia sawayai MARCUS, 1940b, pp. 81–86, figs. 10, *a–f*, 17.

RECORDS OF COLLECTIONS

Albatross station 2379–74, Feb. 1885, Gulf of Mexico, south of Cape St. George, about 25 fathoms, 1 male (ov.), 1 female.

Southwest of Loggerhead Key, Tortugas, Fla., July 31, 1926, about 15 feet, from old rocks and algae, C. R. Shoemaker coll., 1 male (ov.), 1 female.

Off northern end of Loggerhead Key, Tortugas, Fla., Aug. 4, 1926, about 15 feet, from old rocks and algae, C. R. Shoemaker coll., 1 male (ov.).

North end of Loggerhead Key, Tortugas, Fla., Aug. 13, 1926, in shallow water, from old rocks and algae, C. R. Shoemaker coll., 1 male.

Velero III, station A 15–39, Apr. 8, 1939, outside Bahia Honda, Colombia, 8–9 fms., corallines, 1 male.

Velero III, station A 32–39, Apr. 15, 1939, 3 miles north of Coche Island, Venezuela (10°50′30″N., 63°54′30″ W.), 21–35 fathoms, sand and shell, 1 male, 1 juv., fragments.

Like *Achelia gracilis*, *A. sawayai* does not have large spines on the propodus. It is smaller and more spinous than *gracilis*. The 8-jointed palpus separates it clearly from *gracilis*.

This species is found frequently in the vicinity of Bahia de Santos and Itanhaen, Brazil; these are the first records outside those localities. Marcus (1940b, p. 118ff, fig. 17), has described the larval stages of this species in considerable detail.

ACHELIA BREVICHELIFERA, new species

FIGURE 38, *h–l*

Types.—Holotype (female): U.S.N.M. No. 81097, *Fish Hawk* station 1028, September 14, 1881, lat. 39°57′ N., long. 69°17′ W., 410 fathoms. Paratype (female): U.S.N.M. No. 81098, *Albatross*, station 2212, Aug. 23, 1884, lat. 39°59′30″ N., long. 70°30′45″ W., 428 fathoms.

Description.—Trunk: Oval in outline, completely segmented, lateral processes separated by about their own width. Eye tubercle at anterior edge of cephalic segment, small, blunt, with small eyes.

Abdomen: As long as cephalic segment, slightly swollen distally and tapering to a bluntly rounded tip.

Proboscis: As long as first two trunk segments, broadly elliptical, blunt at tip.

Palpus 9-jointed, first and third joints about as long as broad, second and fourth subequal and about five times as long as first joint, joints 6 to 9 small, with a few large spines on each joint.

Chelifore: Scape as broad as long, chela half as long as scape, cuspid at tip.

Oviger: Third and fifth joints subequal, twice as long as fourth. Sixth to tenth joints diminishing in size; terminal joints with a few simple spines.

Leg: Long, slender, with a few scattered spines. Tarsus not much longer than wide, propodus long, slightly curved and with 6 or 7 widely separated spines on the sole. Terminal claw about half as

long as propodus, auxiliary claws nearly four-fifths as long as terminal claw.

Measurements.—As follows:

	Mm.
Proboscis	0. 9
Cephalic segment	0. 5
Trunk	1. 5
Abdomen	0. 5

Third leg:	*Mm.*
First coxa	0. 4
Second coxa	0. 9
Third coxa	0. 5
Femur	1. 98
First tibia	2. 2
Second tibia	2. 1
Tarsus	0. 1
Propodus	1. 1
Terminal claw	0. 5
Auxiliary claw	0. 4

Remarks.—This species is distinct from the fifty-odd other members of the genus because of its widely separated lateral processes. Denticulate spines could not be made out on the spines of the terminal segments of the oviger but may be present in the male, which is still unknown. It is evidently a deep-water (400 fathoms) species; most of the species of *Achelia* are littoral. Hilton (1943a, p. 96) gives a preliminary diagnosis for a species (*Ammothea elongata*) with an "elongate" body and slender legs with spines, from the North Pacific at 695 fathoms.

Genus AMMOTHELLA Verrill, 1900

Ammothella Marcus, 1940b, pp. 88–89.

Chelifores 3-jointed, achelate in adult. Palpi 9-jointed. Oviger 9-jointed, with denticulate spines on terminal segments. Legs long, slender, propodus well developed, with basal spines.

According to Marcus, who has examined specimens and larval stages, *Ammothella appendiculata* and *A. rugulosa* are distinct species. The adults differ principally in the distribution of club-shaped spines. In *rugulosa* these spines are found on the basal joint of the scape of the chelifore and usually on the anterior edge of the cephalic segment over the insertion of the palpus. These club-shaped spines are never found on the basal segment of the chelifore in *appendiculata* or on the lateral processes. These relatively minor differences are supported by differences in the Protonymphon larva: the larva of *appendiculata* is larger and the fingers of the chelae are longer in proportion to the palm than those of *rugulosa*.

Ammothella appendiculata (Dohrn) occurs in the Mediterranean and at Rio de Janeiro, Brazil. It is not represented in the museum collections from North American waters.

1. Without barbed, plumed spines on chelifores; lateral processes and first coxae without lateral spurs 2

   Barbed spines resembling minute feathers on chelifores; lateral processes and first coxae with lateral spurs ..... **marcusi**, new species (p. 247)

2. Clubbed spines present on basal segment of scape and lateral processes. **rugulosa** (p. 247)
Clubbed spines absent from basal joints of scape and lateral processes. **appendiculata** (Dohrn, 1881)

AMMOTHELLA RUGULOSA (Verrill)

FIGURE 39, *a*

Ammothea (*Ammothella*) *rugulosa* VERRILL, 1900, p. 581, figs. 2, 3, pl. 70, fig. 90.
Ammothea appendiculata COLE, 1904b, pp. 323–324, pl. 21, figs. 15–18; pl. 22, figs. 19, 20.
Ammothella rugulosa MARCUS, 1940b, pp. 92–93, fig 12, *a–g*.

RECORDS OF COLLECTIONS

Biscayne Bay, Fla., Jan. 27, 1947, from fouling on vessel bottom, F. M. Bayer coll., 1 male (ov.), 2 females (Univ. Miami).

Fort Jefferson, Tortugas, Fla., Aug. 4, 1924, washed from seaweed, moat near intake pipe, W. L. Schmitt coll., 1 male, 1 female.

East side of Loggerhead Key, Tortugas, Fla., July 28, 1924, W. L. Schmitt coll., 1 specimen.

Tortugas, Fla., July 24, 1930, from seaweed, W. L. Schmitt coll., 1 male.

This small pycnogonid is difficult to examine because of the debris usually found on the surface of the body and on the legs among the numerous spines. The club-shaped spines are about half as long as the unspecialized type on the chelifores and about half as long as the diameter of the scape. Clubbed spines are present over the insertion of the palps in some of the specimens, lacking in others. When there is no clubbed spine over the palpi, there may be a small projecting tubercle instead.

Distribution.—Bermuda, southeastern Florida, Tortugas, Bahia de Santos and Itanhaen, Brazil. A littoral species.

AMMOTHELLA MARCUSI, new species

FIGURE 39, *b–g*

Holotype (*male*).—U.S.N.M. No. 81099, northeast end of Loggerhead Key, Tortugas, Fla., August 6, 1926, about 15 feet, from old rocks and algae, C. R. Shoemaker coll.

Description.—Trunk oval in outline, lateral processes slightly spread distally, with prominent lateral spurs on anterior and posterior corners. Eye tubercle tall, erect, with a small tubercle on its apex. Eyes large, near top of tubercle.

Proboscis about as long as trunk, pyriform.

Abdomen slender, arched, as long as last three trunk segments, slightly swollen distally, and with three ranks of spines.

Palpus slender, the terminal joints considerably longer than wide.

Chelifore slender, basal joint of scape nearly as long as second, chelae rudimentary. Armed with long slender hollow spines and a few minutely barbed spines (fig. 39, *f*).

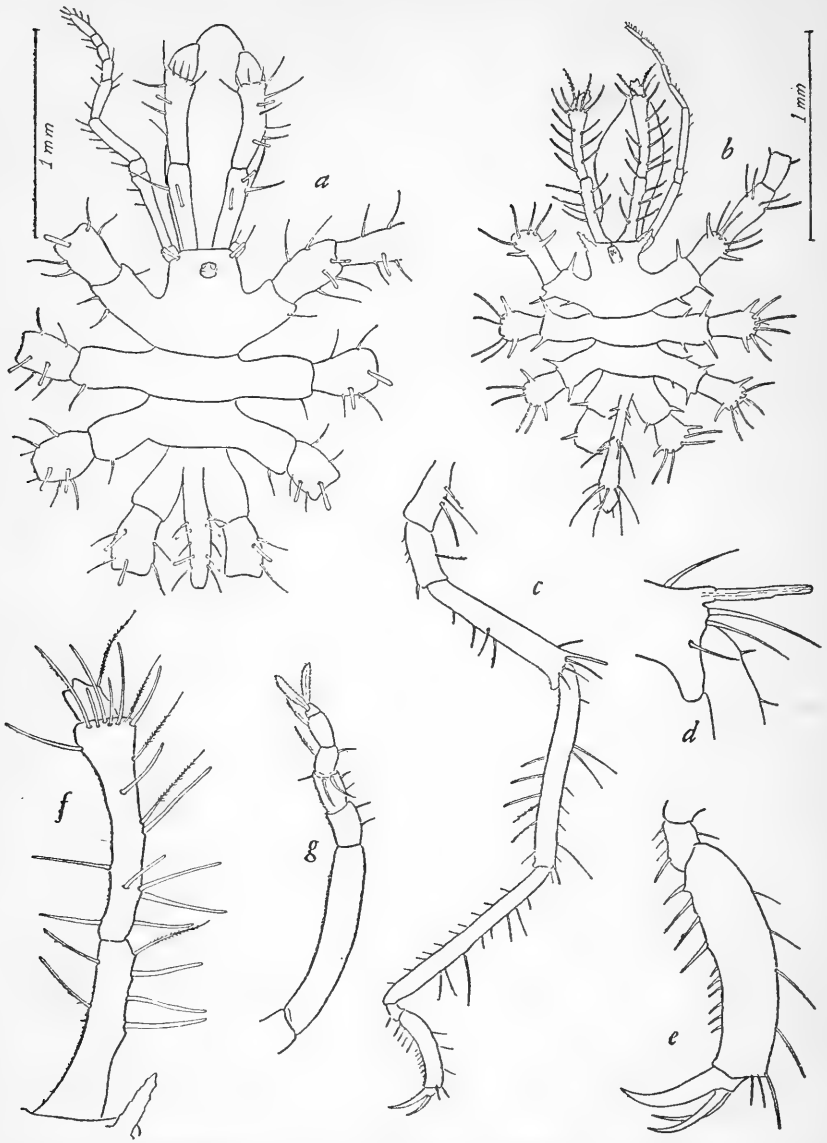

FIGURE 39.—*a*, *Ammothella rugulosa* (Verrill); *b–g*, *A. marcusi*, new species: *b*, Dorsal view of holotype; *c*, leg; *d*, distal end of femur showing duct of cement gland; *e*, tarsus and propodus; *f*, chelifore; *g*, terminal joints of oviger.

Oviger: Terminal joints small, with a few denticulate spines. The two large leaflike spines on the terminal joint are considerably longer than the joint.

Leg: First and third coxae subequal, second about half again as long as first. No genital processes apparent on second coxa. Femur shorter than first tibia, first tibia shorter than second. Tarsus very

short, propodus slightly curved, with four large, straight, widely separated basal spines. Auxiliary claw about three-fourths as long as terminal claw.

Measurements.—As follows:

	Mm
Proboscis	ca. 0. 75
Trunk	0. 75
Second lateral process, width	0. 75
Chelifore	0. 7
Abdomen	0. 6

Third leg:	*Mm*
First coxa	0. 2
Second coxa	0. 3
Third coxa	0. 25
Femur	0. 75
First tibia	0. 9
Second tibia	1. 0
Tarsus	0. 08
Propodus	0. 4
Terminal claw	0. 2
Auxiliary claw	0. 18

Remarks.—This species is smaller than *A. rugulosa,* is more spiny in appearance, and has lateral spurs on the first coxae and lateral processes. The barbed spines on the chelifore and, sparingly, on the coxae, femur and first tibia should distinguish *A. marcusi* from other species in the genus, but they are not easy to see in such a small animal. Also of specific importance are the serrated tubercle over the insertion of the palpus and the long, spinelike femoral cement gland tube.

This species is dedicated to Dr. Ernesto Marcus, of the Departamento de Zoologia of the Universidade de São Paulo, Brazil, in recognition of his excellent work with South American pycnogonids and in commemoration of a delightful correspondence.

Genus NYMPHOPSIS Haswell, 1884

Nymphopsis Williams, 1933, pp. 173–180.

Chelifores 2- or 3-jointed, achelate; scape usually trumpet-shaped. Palpi 9-jointed. Ovigers 10-jointed. Legs rather heavy, armored in most species, with large compound spines and spiny tubercles, propodus well developed.

This genus is represented in the Caribbean region by two species, *Nymphopsis anarthra* and *N. duodorsospinosa.* Since Williams drew up a key to the genus, three more species have been referred to it, and the following key is based on a somewhat different series of characters:

1. Scape of chelifores 1-jointed 2
   Scape 2-jointed 3
2. Dorsal trunk tubercles small, shorter than eye tubercle (Queensland). **armata** Haswell (1884)
   Dorsal trunk tubercles taller than eye tubercle (Venezuela) **anarthra** (p. 250)
3. Dorsal trunk tubercles present 4
   Without dorsal trunk tubercles (Timor) **korotnewi** Schimkewitsch (1888)

4. Three dorsal trunk tubercles 7
   Two dorsal trunk tubercles 5
5. Without trunk segmentation; numerous compound spines 6
   Cephalic segment separated by suture; without compound spines (Falkland Islands) ..... **denticulata** Gordon (1932)
6. Auxiliary claws minute (Tortugas, South Carolina, Baja California, Galápagos) ..... **duodorsospinosa** (p. 250)
   Auxiliary claws one third as long as terminal claw (East Indies, Japan). **muscosa** Loman (1908)
7. Without terminal spines on dorsal trunk tubercles 8
   Large terminal spine on trunk tubercles (Capetown) ..... **abstrusa** Loman (1923)
8. Auxiliary claw well developed; processes on tibial joints confined to proximal half (Queensland) ..... **acinacispinatus** Williams (1933)
   Auxiliary claws minute; processes on tibial joints generally distributed (California) ..... **spinosissima** (Hall, 1912)

NYMPHOPSIS ANARTHRA Loman

Nymphopsis anarthrus LOMAN, 1928a, pp. 39–42, 1 fig.

This species is not represented in the collections examined. It differs from the following species in having a 1-jointed scape and in having dorsal trunk tubercles which are noticeably taller than the eye tubercle. Loman's inadequate figure suggests a different arrangement of spiny tubercles on the tibiae, especially the lack of a saddle or bare spot on the middle of the first tibia, and a longer abdomen. *Nymphopsis anarthra* was collected from Tortuga Island, north of Venezuela.

NYMPHOPSIS DUODORSOSPINOSA Hilton

FIGURE 40

Nymphopsis duodorsospinosa HILTON, 1942b, pp. 303–305, pl. 45.

RECORD OF COLLECTIONS

Folly River, S. C., Apr. 24, 1935, G. R. Lunz coll., 1 male, 1 female.

Tortugas, Fla., June 1908, 8–10 fathoms, among Bryozoa, L. J. Cole coll., 1 female.

Identification of these specimens was confirmed by direct comparison with the type specimens, from which they differ only in their slightly smaller size and shorter abdomen.

Description (based on type material and Atlantic specimens)[24].—

Trunk: Broadly oval in outline, lateral processes well separated. Dorsal trunk tubercles two, covered with small spines but not sharply pointed and without a terminal spine, about the same height as the eye tubercle. Eye tubercle erect, about twice the diameter of the trunk tubercles, truncate at tip. Eyes distinct, near apex. On the median dorsal end of each lateral process is a low spiny tubercle, it is inconspicuous on the last pair of lateral processes.

[24] Hilton, 1942b, p. 304, designates a female as the type, but the "holotype" now at the Allan Hancock Foundation of the University of Southern California, is a male.

Proboscis ovoid, blunt at tip, about as long as the trunk, directed ventrally.

Abdomen about as long as trunk, erect but arched, with three pairs of large dorsal spines, some of them compound.

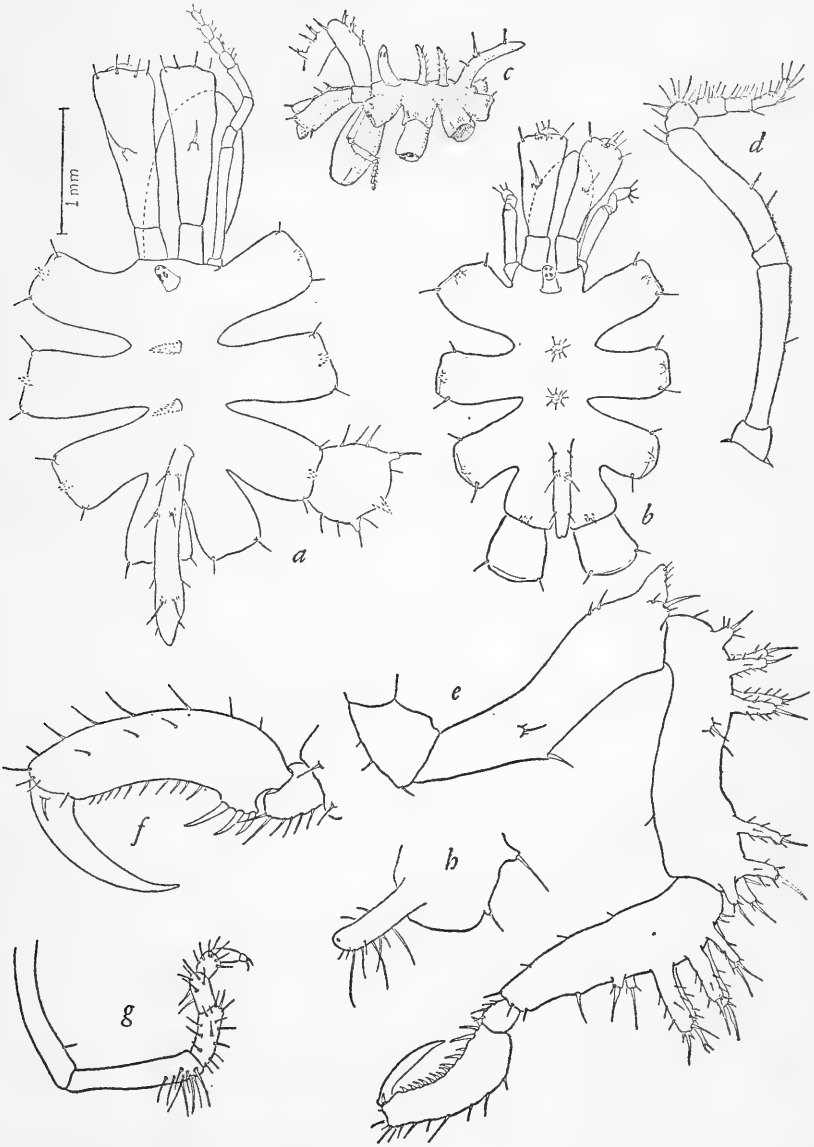

FIGURE 40.—*Nymphopsis duodorsospinosa* Hilton: *a*, Dorsal view of holotype; *b*, dorsal view of South Carolina specimen (female); *c*, dorsolateral view of same specimen; *d*, palpus; *e*, leg; *f*, tarsus and propodus of paratype; *g*, oviger of male; *h*, genital process of holotype.

Chelifore 3-jointed, first joint about one-fourth as long as second. Second joint trumpet-shaped, with a fringe of spines around the distal rim, and a large spine on a low tubercle at about the middle of the joint. Chela globular, hidden in the end of the scape.

Palpus 9-jointed, first, third, and fifth joints subequal, second joint longer than fourth. Terminal joints diminishing in size, spinose.

Oviger 10-jointed, fourth and fifth joints longest, Male: A cluster of spines at the end of the fifth joint, joints 6 to 8 spinose. Ninth joint without spines, tenth very small, with two hooklike terminal spines which may have minute denticulations. Female: Fifth joint without spines, joints 6 to 9 subequal, with two rows of spines on the ventral surface. Tenth joint as in the male.

Leg stout, flexed in preserved specimens. The first coxa of the male is more spiny than that of the female. The male genital protuberance is fingerlike, about four times as long as its diameter, and bears a number of spines on its distal half which are about twice as long as the diameter of the process. The female process is shorter, broader, and without spines. Femur relatively free of dorsal spines, but with a series of large spines at about the middle of the joint, one on each side and one ventrally (not two spines along the ventral margin as figured by Hilton). Tibiae armed with a series of tall spinous tubercles with long terminal spines. On the first tibia these tubercles are clustered at both ends, and on the second they are restricted to the proximal half of that joint. Tarsus very short, with slender spines ventrally. Propodus slightly curved, with three heavy basal spines, and 10 or 11 spines on the sole. Terminal claw about three-fourths as long as propodus, auxiliary claws very small, but distinct.

Measurements.—As follows (leg flexed, not measured):

	Mm.
Proboscis	ca. 2. 0
Trunk	2. 0
Second lateral process, width	2. 5
Abdomen (from above)	1. 6
Chelifore	1. 6

Remarks.—The differences between the abdomen of the holotype and South Carolina specimens are slightly exaggerated by the perspective in the figures; but they are not of specific significance.

Distribution.—As indicated in the key, this species is found on both Atlantic and Pacific coasts, at Tortugas and South Carolina on the Atlantic side of North America, and at the Galápagos and Baja California on the Pacific side of the continent. It is evidently a sublittoral species. Hilton lists it from shore at the Galápagos and at 26 fathoms from San Francisquito Bay, Baja California.

Genus PARANYMPHON Caullery, 1896

Palpi 7-jointed. Chelifores chelate, scape 1-jointed. Ovigers 10-jointed. Trunk unsegmented. Genital pores were observed in the second coxa of the last three pairs of legs in the females; in the males they could be found only on the last legs. There is only one known species.

PARANYMPHON SPINOSUM Caullery

FIGURE 41

Paranymphon spinosum CAULLERY, 1896, p. 361, pl. 12, figs. 1–6.—MEINERT, 1899, pp. 46–47, pl. 4, figs. 20–28.—NORMAN, 1908, pp. 222–224, pl. 30, figs. 10–14.—BOUVIER, 1917, p. 17, pl. 3, figs. 3–6.—STEPHENSEN, 1933, p. 6.

FISH HAWK RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
894	Oct. 2, 1880	39 53 00	70 58 30	365	2
1093	Aug. 11, 1882	39 56 00	69 45 00	349	1

ALBATROSS RECORDS

2203	Aug. 19, 1884	39 34 15	71 41 15	705	1
2214	Aug. 22, 1884	39 57 00	70 32 00	475	2
2547	Aug. 8, 1885	39 54 30	70 20 00	390	2
2680	July 16, 1886	39 50 00	70 26 00	555	1 (ov. ♂).

The peculiar stellate processes on the body integument described by Norman were not evident in this material. The local bathymetric range falls within that given by Stephensen, 385–2,300 meters.

Distribution.—A North Atlantic Basin species, south of latitude 65°. These are the first published records from the western Atlantic.

Genus ASCORHYNCHUS Sars, 1877

Barana DOHRN, 1881, p. 123.
Scaeorhynchus WILSON, 1881, p. 247.

Chelifores 2- or 3-jointed, chelae subchelate or minute pincers. Palpi 9-jointed. Oviger 8- or 9-jointed, with terminal claws. Propodus intermediate, without heel and basal spines; or tapering. Proboscis large, pyriform, usually carried ventrally.

Represented in western North Atlantic waters by four species:

1. Tarsus short, propodus intermediate, with spines on sole 2
   Tarsal joints tapering; large abyssal species ..... **armatus** (p. 255)
2. Scape 1-jointed, without tall, pointed trunk tubercles 3
   Scape 2-jointed; dorsal trunk tubercles tall and pointed.
   serratum, new species (p. 259)

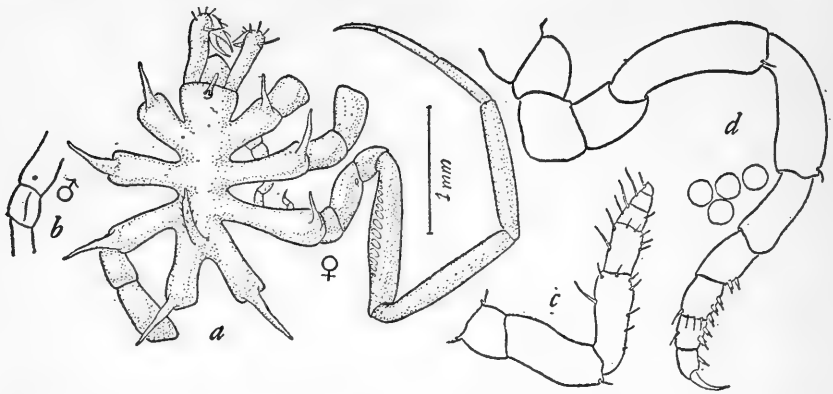

FIGURE 41.—*Paranymphon spinosum* Caullery: *a*, Dorsal view of female; *b*, genital pore of male; *c*, palpus; *d*, oviger.

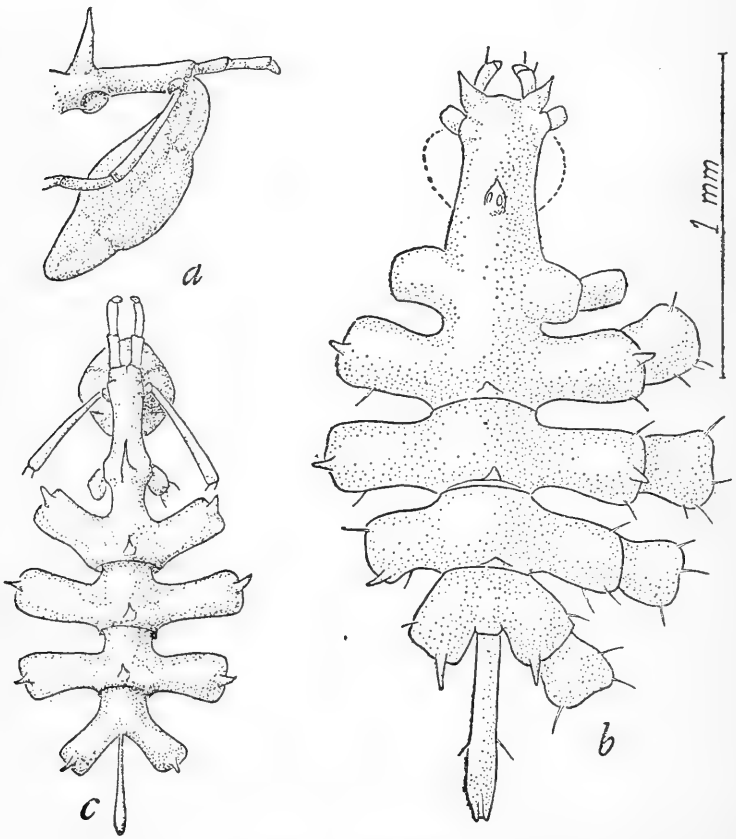

FIGURE 42.—*a*, *Ascorhynchus armatus* (Wilson); *b*, *A. latipes* (Cole).

3. Lateral processes not separated by their own diameter; scape shorter than neck. **latipes** (p. 256)

Lateral processes separated by their own diameter; scape as long as neck. **colei** (p. 257)

ASCORHYNCHUS ARMATUS (Wilson)

FIGURES 42, *a*; 43

Scaeorhynchus armatus WILSON, 1881, pp. 248–249, pl. 2, figs. 3, 4; pl. 5, figs. 26–31.—VERRILL, 1885, p. 560, fig. 171.

Ascorhynchus agassizi BOUVIER, 1937, p. 38.

Ascorhynchus armatus HEDGPETH, 1943b, pp. 49–50.—NEEDLER, 1943, p. 15, fig. 19, *a-e*.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2074	Sept. 3, 1883	41 43 00	65 21 50	1,309	6
2077	Sept. 4, 1883	41 09 40	66 02 20	1,255	2
2084	Sept. 5, 1883	40 16 40	67 05 15	1,290	1
2205	Aug. 20, 1884	39 35 00	71 18 45	1,073	2
2706	Aug. 27, 1886	41 28 30	65 35 30	1,188	2
2725	Oct. 24, 1886	36 34 00	73 48 00	1,374	2
2731	Oct. 25, 1886	36 45 00	74 28 00	781	1

About half of this material was sent to me for examination; the specimens are all large (about 15 cm. in extent) and show little variation. Wilson's description of the male oviger is brief and unsupported by a figure.

Ascorhynchus agassizi Schimkewitsch (1893, pp. 36–39) from the Pacific side of the Isthmus of Panama is very close to *A. armatus*, especially to the smaller specimens taken in relatively shallow water north of Cuba. Some of these specimens, as I have previously noted, are minutely setose and have small chelae. The principal difference between the Atlantic and Pacific species seems to be in the structure of the male oviger. According to the figure given by Schimkewitsch (*loc. cit.*, pl. 2, fig. 13), the hairs in the tuft at the end of the sixth joint of *A. agassizi* are heavier and differently arranged than in *A. armatus*. Also, the denticulate spines on the terminal segments appear to be shorter and thicker in *A. agassizi*. These differences may be the fault of the artist or the angle from which the structure was examined. All the known male specimens of *A. agassizi* are types and unavailable to me for examination.

Bouvier's identification of *Ascorhynchus agassizi* from the west coast of Africa is probably an error for *A. armatus*. It is published without comment as to its size or general appearance. Possibly the specimen is of the smaller type as taken by the *Atlantis* north of Cuba. This record would indicate that the species is generally distributed in the North Atlantic Basin.

ASCORHYNCHUS LATIPES (Cole)

FIGURE 42, *b*

Barana latipes COLE, 1906a, pp. 217–22, pls. 1, 2.
Ascorhynchus latipes MARCUS, 1940b, p. 93.

RECORD OF COLLECTIONS

Tortugas, Fla., 1924, W. L. Schmitt coll., 1 male.

Bird Key Reef, Tortugas, Fla., July 31, 1924, from rocks, south end, W. L. Schmitt coll., 1 female.

Key West, Fla., 2 feet, from Peabody Acad. Sci., 1 male, 1 female (M.C.Z.).

Piedra Priata Reef, Barahona Harbor, Dominican Republic, August 17, 1933, in breakers (2 feet, station 226), J. C. Armstrong coll., 20 specimens (including, ovigerous male) (A.M.N.H.).

Piedra Priata Reef, north of sand spit, Barahona Harbor, Dominican Republic, August 8, 1933 (1–2 feet, station 203), J. C. Armstrong coll., 1 male (A.M.N.H.).

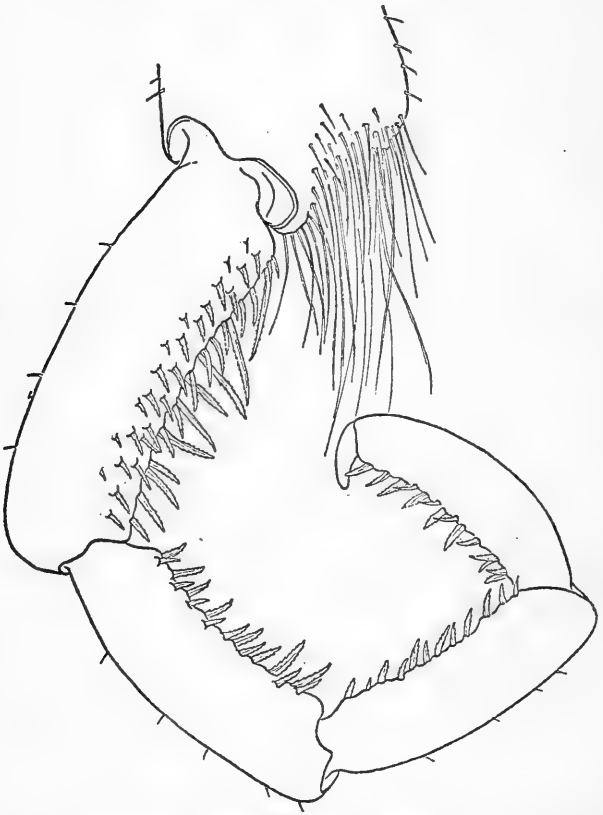

FIGURE 43.—*Ascorhynchus armatus* (Wilson): Terminal joints of oviger (male).

A small littoral species, from the Bahamas and Florida to southern Hispaniola. It is about 15–20 mm. in extent, with close-set lateral processes and spiny legs. This species superficially resembles *A. arenicola* (Dohrn), which occurs on the Atlantic coast of Morocco, but is actually quite different. The forward prolongation or neck of

the cephalic segment is much shorter than the scape, and the lateral processes are more widely separated in *A. arenicola*.

ASCORHYNCHUS COLEI Hedgpeth

FIGURE 44, *g–k*

Ascorhynchus colei HEDGPETH, 1943b, p. 50 (diagnosis).

Types.—Holotype (female): U.S.N.M. No. 81100, American Shoal Light bearing Northeast by North 8 miles, Pourtalès Plateau, 70–80 fathoms, State University of Iowa Bahamas Expedition 1893, Station 62. Paratypes: One female, U.S.N.M. No. 81103, same locality; 1 male, 1 female, M.C.Z. No. 12233, off Sombrero Key, Fla., April 2, 1872, William Stimpson coll. (Bache Expedition.)

Additional record.—Bend of Piedra Priata Reef, Barahona Harbor, Dominican Republic, July 23, 1933 (0–2 feet, station 167), J. C. Armstrong coll., 1 female (A.M.N.H.).

Description.—Trunk rather heavy, lateral processes separated by slightly more than their own diameter. Dorsal trunk tubercles not quite so tall as eye tubercle, pointed. Tubercles on lateral processes very short. In addition to the dorsal trunk tubercles on the three anterior trunk segments there is a small one over the base of the abdomen. Eye tubercle cylindrical at base, bluntly conical at apex. Eyes large, slightly protuberant, at middle of tubercle.

Proboscis pyriform, about three-fourths as long as trunk.

Abdomen about as long as last trunk segment, cylindrical.

Palpus 9-jointed. Second joint slightly curved, larger distally, longer than fourth.

Chelifore: Scape 1-jointed, about as long as neck. Chela globular.

Oviger heavy, 9-jointed. Third joint curved, without lateral tubercles, fourth joint about as long as third. Denticulate spines: 11:8:6:12. The last spine is not markedly denticulate and appears to be opposed to the terminal claw. Leg short, thick, with a prominent lateral line on the anterior side, extending out to the propodus. Femur and tibiae subequal. Tarsus very short, not much longer than wide. Propodus slender, curved, with a row of fine spines on the sole. Terminal claw stout, blunt, about three times as long as width at base.

Measurements.—As follows:

	Mm.		*Mm.*
Proboscis:		Third leg:	
Length	7. 25	First coxae	1. 0
Greater diameter	2. 5	Second coxa	2. 5
Trunk	10. 0	Third coxa	1. 2
Cephalic segment	4. 5	Femur	6. 5
Second lateral process, width	4. 75	First tibia	7. 0
Abdomen	1. 9	Second tibia	6. 5
		Tarsus	0. 5
		Propodus	2. 25
		Terminal claw	0. 5

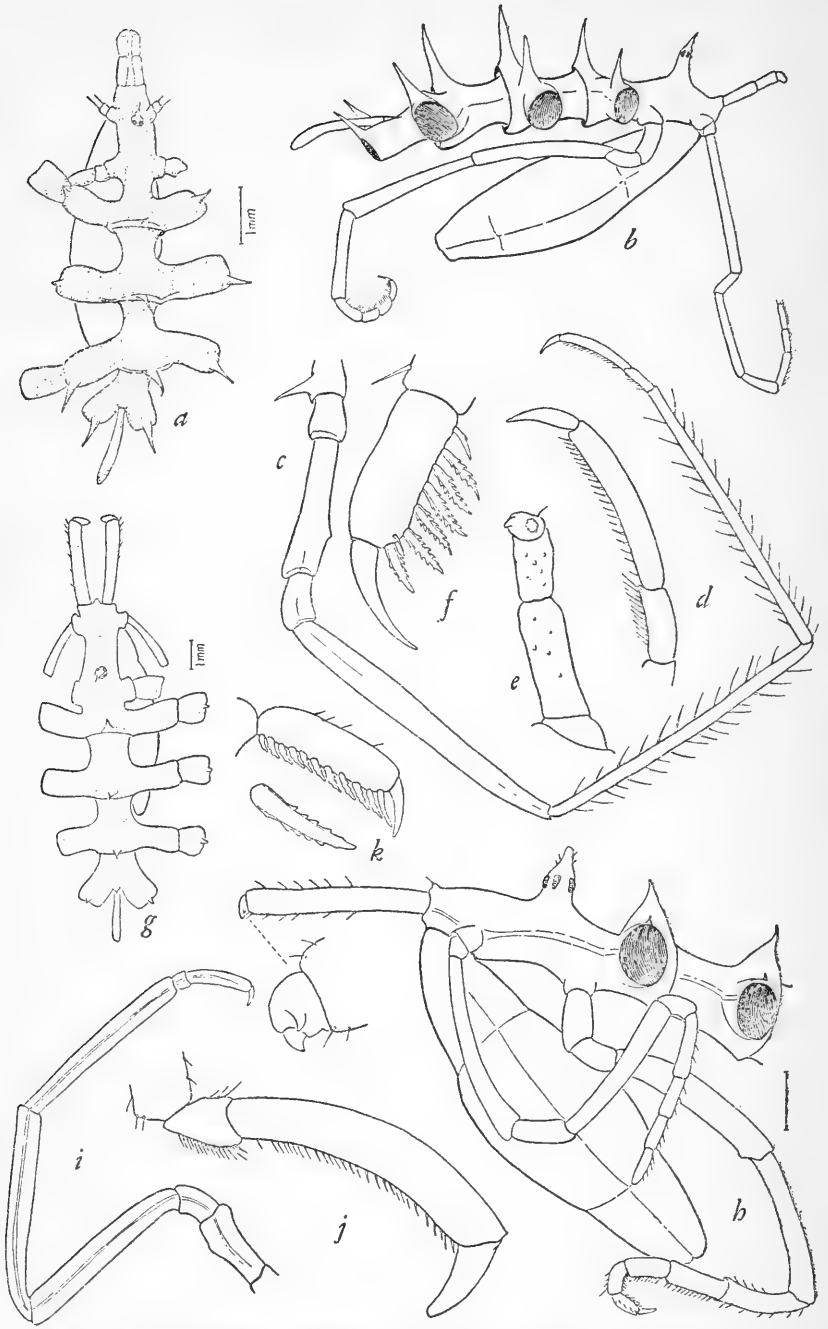

FIGURE 44.—*a–f*, *Ascorhynchus serratum*, new species: *a*, Dorsal view of holotype; *b*, lateral view; *c*, leg; *d*, tarsus and propodus; *e*, ventral view of chelifore; *f*, terminal joint of oviger; *g–k*, *A. colei* Hedgpeth: *g*, Dorsal view; *h*, lateral view of anterior segments; *i*, leg; *j*, tarsus and propodus; *k*, terminal joint of oviger.

Remarks.—The legs of one specimen have a vestment of very fine setae, those of the other specimens are glabrous. There is no significant variation in the size of the specimens. This species is closely related to *Ascorhynchus abyssi* Sars, 1891 (=*A. tridens* Meinert) from which it differs in the shape of the chelae and the shorter terminal claw. *A. abyssi* is a blind deep-water species, and does not have a fourth dorsal tubercle over the base of the abdomen. This is evidently a widely distributed Caribbean species, to judge from its occurrence in both Florida and southern Hispaniola.

ASCORHYNCHUS SERRATUM, new species

FIGURE 44, *a–f*

Holotype (female).—U. S. N. M. No. 81101, *Albatross* station 2359, Jan. 29, 1885, off Yucatán, lat. 20° 19′ 10″ N., long. 87° 03′ 30″ W., 231 fathoms.

Description.—Trunk slender, lateral processes separated by their own diameter. Dorsal trunk tubercles on first three trunk segments, tall, sharp; tubercles on lateral processes about two-thirds as tall. Eye tubercle near anterior end of neck, tall as dorsal tubercles, sharply pointed. Eyes about one-third from tip.

Proboscis pyriform, nearly as long as trunk, blunt at tip.

Abdomen as long as third trunk segment, slender, tip curved ventrally.

Palpus 8-jointed, longer than trunk. Second joint longest, fourth about two-thirds as long as second. Terminal joints slender, the last three setose ventrally.

Chelifore: Scape 2-jointed, the second slightly shorter than the first. Chela rudimentary.

Oviger 8-jointed, third slightly longer than fourth, with an angular projection near the distal third. Terminal joints with a row of long denticulate spines. Terminal claw curved, without denticulations, about half as long as terminal joint.

Leg slender, coxae without lateral projections or tubercles. Second coxa longer than first and third together. Femur slightly longer than first tibia, second tibia longer than femur, but shorter than first. Tibiae with spines slightly longer than the diameter of their joints, along their entire length. Tarsus little more than one-third as long as propodus, with a row of close-set ventral spines. Propodus slender, slightly curved, with about 20 spines on the sole. Terminal claw about as long as the tarsus.

Measurements.—As follows:

	Mm.	Third leg:	*Mm.*
Proboscis	4. 9	First coxa	0. 8
Diameter	1. 5	Second coxa	2. 5
Trunk	5. 75	Third coxa	1. 0
Cephalic segment	2. 5	Femur	5. 25
Second lateral process, width	3. 0	First tibia	5. 5
Abdomen	1. 3	Second tibia	5. 0
		Tarsus	0. 5
		Propodus	1. 3
		Terminal claw	0. 5

Remarks.—This handsome species seems to be the only member of the group within the genus in which the propodus is intermediate which has a 2-jointed scape. It is further distinguished by the very tall pointed tubercles on the trunk and lateral processes, which give it a serrated appearance.

Genus EURYCYDE Schiödte, 1857

Chelifore 3-jointed, subchelate, scape slender. Palpi 9-jointed. Oviger 9- (or 10-)jointed, with terminal spine or spines. Propodus intermediate, without heel but with large terminal claw. The proboscis has a jointed petiole.

This genus is closely related to *Ascorhynchus* but differs from that genus in having a jointed proboscis. All the known species have long spines on the eye tubercle and abdomen. It is represented in eastern American waters by one species, hitherto known from west Africa. The widely distributed Boreal-Arctic *Eurycyde hispida* (Krøyer) has not been taken south of Baffin Land; it can easily be recognized by the lack of spines on the eye tubercle.

EURYCYDE RAPHIASTER Loman

FIGURE 45

Eurycyde raphiaster LOMAN, 1912, p. 13.—BOUVIER, 1917, pp. 33–35, pl. 4, figs. 2–7.

RECORDS OF COLLECTIONS

Lisbon Reef, Andros Island, Bahamas, May 13, 1912, from sponge, P. Bartsch coll., 1 male.

Tortugas, Fla., Bush Key, shallow water, male, July 16, 1926, from algae, C. R. Shoemaker coll. 1 (ov.).

At bend of Piedra Priata Reef, Barahona Harbor, Dominican Republic, July 8, 1933 (3 foot station 128), J. C. Armstrong coll., 1 male (A.M.N.H.).

Velero III, station A 15–39, Apr. 8, 1939, outside Bahia Honda, Colombia, 8–9 fathoms, corallines, 1 male, 1 juv.

This species was established for a single female found near Cape Verde. These specimens are evidently the male of that species. The lateral processes are slightly more widely separated, and there are six spines on the abdomen instead of seven. The spurlike proc-

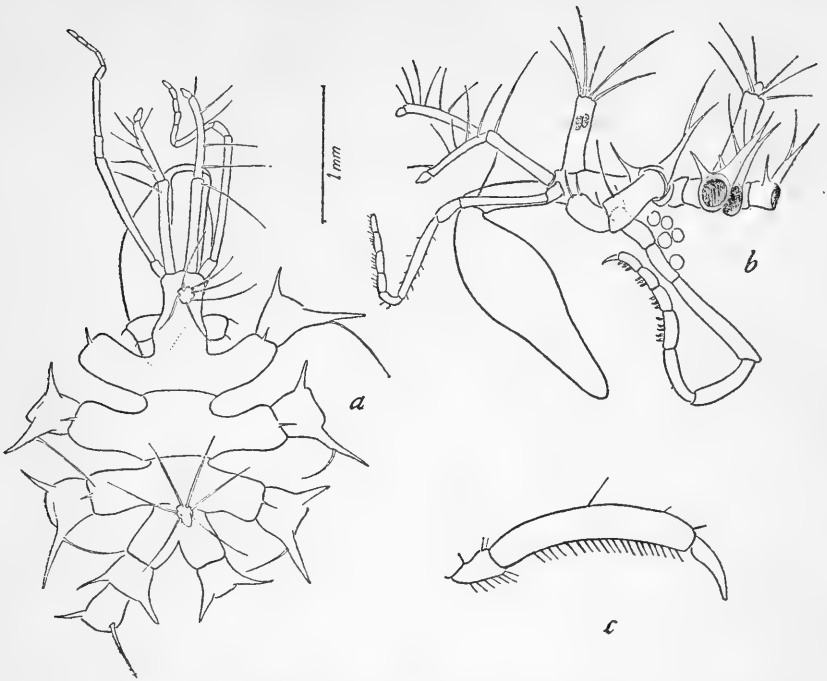

FIGURE 45.—*Eurycyde raphiaster* Loman: *a*, Dorsal view; *b*, lateral view (posterior end tilted away from field); *c*, tarsus and propodus.

esses on the first coxae have a long spine projecting dorsally, which is not present in the Cape Verde specimen. These differences are probably sexual.

Genus EPHYROGYMNA [25] Hedgpeth, 1943

Chelifore 3-jointed, subchelate. Palpi with four well-marked basal joints and an undetermined number of coalesced terminal segments. Oviger 10-jointed, with a large terminal claw. Propodus intermediate, without auxiliary claws. The chelifores, palpi, and proboscis originate within a flared prolongation of the cephalic segment.

EPHYROGYMNA CIRCULARIS Hedgpeth

FIGURE 46

Ephyrogymna circularis HEDGPETH, 1943b, pp. 51–52, pl. 9, figs. *a–g*.

A deep-water (525 fathoms) form, dredged off Martinique by the *Blake*. The anterior extension of the cephalic segment forms a rim around the origin of the proboscis, palpi, and chelifores; there is a notch ventrally beneath the proboscis, permitting the downward movement of that organ.

[25] The derivation of this name was omitted from the original description of this genus in the Proceedings of the New England Zoological Club (Hedgpeth, 1943b, p. 51). It should read as follows: *Ephyrogymna:* Ἐφύρα + γυμνός A naked sea nymph.

Genus HETEROFRAGILIA Hedgpeth, 1943

Chelifore 3-jointed, chelate. Palpi 9-jointed. Oviger 10-jointed, with terminal claw. Propodus intermediate, with a large terminal claw but no auxiliary claws.

HETEROFRAGILIA FIMBRIATA Hedgpeth

FIGURE 47

Heterofragilia fimbriata HEDGPETH, 1943b, pp. 53–54, pl. 10, figs. *a–i*.

Another curious pycnogonid from near Martinique (476 fathoms) whose nearest relative appears to be the East Indian *Pycnofragilia hamisetosa* (Loman).[26] In some respects it also resembles *Cilunculus* Loman (1908) but does not have the well-developed propodus characteristic of that genus. *Cilunculus* was originally reported from the East Indies and Japan, but it is also a Western Hemisphere genus, since Mello-Leitão's *Acanthammothella pennai* (1946) from Brazil is obviously a *Cilunculus*.

Both of these aberrant genera from Martinique are known from

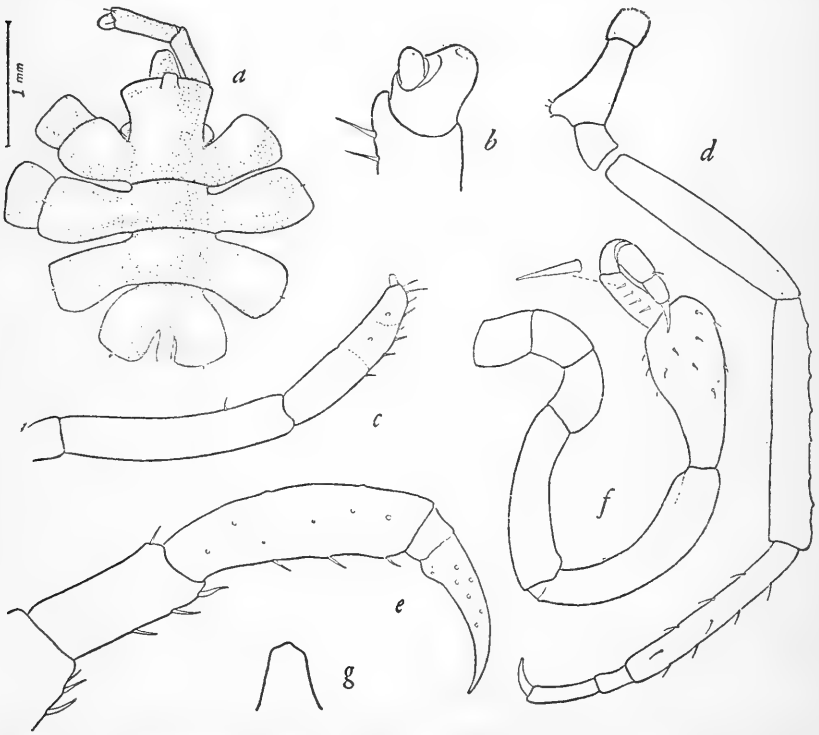

FIGURE 46.—*Ephyrogymna circularis* Hedgpeth: *a*, Dorsal view of holotype (proboscis foreshortened); *b*, ventral view of chela; *c*, terminal joints of palpus; *d*, leg; *e*, tarsal joints; *f*, oviger; *g*, anterior view of eye tubercle.

[26] Pro *Fragilia* Loman, 1908, preocc. *Fragilia* Deshayes 1845 (Mollusca). Hedgpeth, 1943b, p. 53.

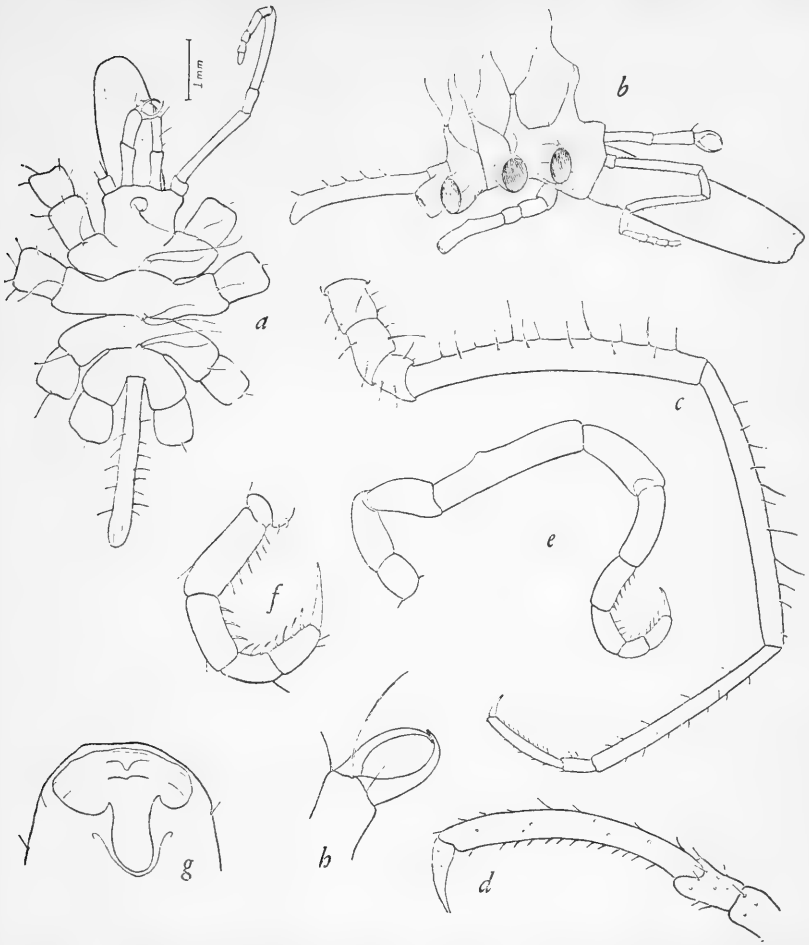

FIGURE 47.—*Heterofragilia fimbriata* Hedgpeth: *a*, Dorsal view of holotype; *b*, lateral view; *c*, leg; *d*, tarsus; *e*, oviger; *f*, terminal joints of oviger; *g*, ventral view of tip of proboscis; *h*, chela.

single specimens, and it is probable that future dredging in this area will turn up other curiosities.

CALYPSOPYCNON, new genus

Chelifore 2-jointed, scape trumpet-shaped, the chela chelate and hidden within the rim. Palpi 9-jointed. Oviger 9 (or 8?)-jointed, without a terminal claw. Propodus and terminal claw long, tapering. Body elongate, segmented. The structure of the chelifore resembles that of *Nymphopsis*, but the very long terminal claw of the leg, together with the short tarsus, resembles *Nymphonella* Ohshima (1927).

The pycnogonid described below was found among the collections of A. E. Verrill by Dr. Stanley C. Ball at the Peabody Museum.

Unfortunately it is without any label or clue to its origin, but it is possible that it may have been collected at Bermuda by Verrill on one of his excursions to that island. It is equally possible that it may have been taken from an *Albatross* dredge collection, perhaps in the Philippines. A pencil sketch, possibly of this same specimen, was found among some notes on Philippine species prepared by Dr. Leon J. Cole more than 30 years ago. It is, however, without any data, and was not drawn by Dr. Cole, and he cannot remember how it came to be included among his notes.

The specimen is mounted in balsam, which has dried into a beautiful pattern of air bubbles around the legs and trunk and has flattened the specimen to less than 0.25 mm. in thickness; in fact the specimen looks more like a design for surrealistic wall paper than a pycnogonid. This makes it difficult to see some of the finer details. It is such an interesting creature, however, that I cannot resist publishing a description of it in spite of the lack of information concerning it.

CALYPSOPYCNON GEORGIAE,[37] **new species**

FIGURE 48

Holotype (female).—Y.P.M. No. 7308.

Description.—Trunk completely segmented, lateral processes separated by about their own width. Eye tubercle low, rounded, with four large well-developed eyes.

Proboscis half as long as trunk, elliptical in outline.

Abdomen not quite so long as proboscis, slender. There appears to be a protuding structure of some kind about a third of the way from the end. This may be a fold caused by the flattening of the specimen.

Palpus 9-jointed, the second longest, fourth half as long as the second. Terminal joint as long as preceeding two joints together. No spines or setae.

Chelifore 2-jointed, scape expanded distally, chela submerged in the cup. Chelae small, chelate, with a large terminal spine on each blunt finger.

Oviger: There seem to be three basal joints on one oviger, and two on the other, but the details are obscure. Probably there are three basal joints on each oviger. The four terminal joints bear a single row of spines in the following formula: 9:12:12:12. Terminal joint tapering toward tip.

Leg: Second coxa longest, third slightly shorter, first shortest. Femur slightly longer than the coxae together. Tibiae subequal, slightly longer than the femur. Tarsus about half again as long as wide, propodus nearly as long as femur, terminal claw as long as

[37] Καλυψώ, one of the 3,000 daughters of Tethys and Oceanus (or perhaps Atlas), the mistress of the Island of Ogygia, whose charms fascinated that man about the Mediterranean, Ulysses, for seven years, πυκνόν compact or thickset. This species is dedicated to a friend who shares Calypso's charms.

propodus, tapering to a point. There is a small rounded dorsal tubercle on the lateral processes and first two coxae of all the legs. Genital pores present on all second coxae.

Measurements.—As follows:

	Mm.
Proboscis	2. 3
Trunk	4. 8
Abdomen	2. 0
Scape	1. 25

Third leg:	*Mm.*
First coxa	0. 7
Second coxa	1. 25
Third coxa	1. 0
Femur	2. 5
First tibia	3. 0
Second tibia	3. 0
Tarsus	0. 5
Propodus	2. 0
Terminal claw	1. 8

Remarks.—The specimen is an almost mature female; the trunk and legs, well out into the propodus, are densely packed with small eggs, about 0.04 mm. in diameter.

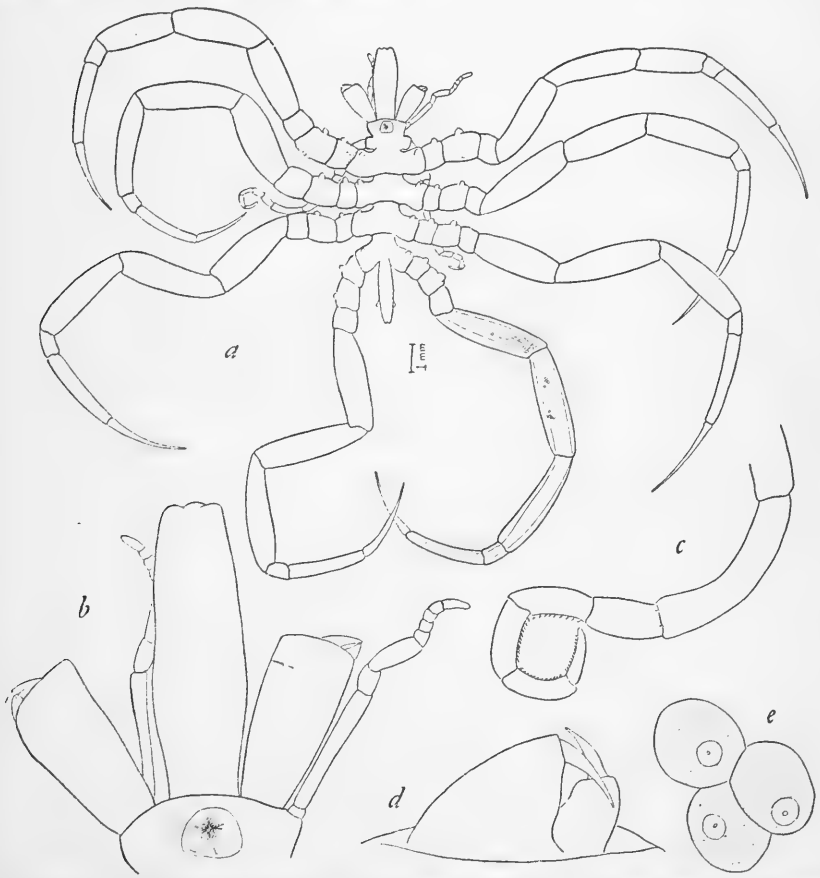

FIGURE 48.—*Calypsopycnon georgiae*, new genus and species: *a*, Dorsal view; *b*, proboscis, chelifores, and palpi; *c*, oviger; *d*, chela; *e*, eggs.

Family TANYSTYLIDAE Schimkewitsch, 1913

Chelifores 1- or 2-jointed, achelate, very small. Palpi 4- to 6-jointed. Ovigers 10-jointed, in both sexes. Legs short, with well-developed propodus. A group of small compact forms, represented by the genus *Tanystylum* in the western Atlantic. In *Clotenia*, a genus represented on the African coast, the palpi are 4-jointed. This genus may be a taxonomic fiction.

Genus TANYSTYLUM Miers, 1879

Chelifores 1- or 2-jointed. Palpi 5- or 6-jointed. Ovigers 10-jointed. Trunk compact, circular.

It is probably an accident of collecting that no species of *Tanystylum* are represented in the collections from the Caribbean proper. *Tanystylum orbiculare* is a common littoral species from Woods Hole to Virginia, South Carolina, and Florida and has been collected by Marcus in the vicinity of Rio de Janeiro, Brazil. Another curious anomaly is the collection of *Tanystylum calicirostre* at Bermuda. The species was previously known from the Gulf of Panama, on the Pacific side of the isthmus.

1. Proboscis rounded or slightly tapered at tip ..... **orbiculare** (p. 266)
   Proboscis conspicuously tapered or styliform ..... **calicirostre** (p. 268)

TANYSTYLUM ORBICULARE Wilson

FIGURES 8; 49, *a*

?*Pasithoe umbonata* GOULD, 1844, pp. 92–93.

Tanystylum orbiculare WILSON, 1878b, pp. 5–7, pl. 2, fig. 2, *a–f*; 1880, pp. 471–473, pl. 3, fig. 11.—MORGAN, 1891, pp. 37–49 (embryology).—SUMNER, OSBURN, and COLE, 1913, pp. 141–142, 677, chart 120.—FISH, 1925, p. 161.—MARCUS, 1940b, pp. 105–108, fig. 15, *a–h*.—HEDGPETH, 1943b, pp. 54–55.

RECORDS OF COLLECTIONS

Fish Hawk station 8341, Oct. 22, 1915, Chesapeake Bay, lat. 37°22′12″ N., long. 76°10′25″ W., 9.5 fathoms, 1 female.

Fish Hawk station 8506, Apr. 22, 1916, Chesapeake Bay, lat. 37°16′50″ N., long. 76°14′27″ W., 5.5 fathoms, 1 male.

Fish Hawk, July 15, 1916, on Lynnhaven Trolley bridge, Va., 2 males, 2 females.

Virginia Beach, Va., from mast washed ashore, Oct. 5, 1943, W. H. Ball, coll. 1 male, 2 females, 3 juv.

One mile inside May River, S. C., Jan. 17, 1891, 1 specimen.

Charleston Harbor, S. C., Apr. 11, 1935, 4 specimens.

Port Aransas, Tex., Mar. 25, 1945, from sargassum cast ashore, J. W. Hedgpeth coll., numerous specimens, but no ovigerous males.

(Also numerous specimens from Marthas Vineyard, Newport, R. I., and Woods Hole).

A common but easily overlooked littoral species, not found north of Cape Cod. Specimens from Rio de Janeiro are heavier than typical material from southern New England, and the segmentation of the

third and fourth joints of the palpus is not evident except as a constriction in the Brazilian variety. In the sargassum specimens from Texas the segmentation between these joints is more plainly marked but does not seem to be a functional articulation. These specimens are all quite small, being not more than 4 mm. in extent, and usually about 3 mm. (fig. 8).

Both Norman (1908) and Bouvier (1923) considered *Clotenia conirostris* Dohrn (1881) synonymous with *T. orbiculare*. Except for the 4-jointed palpi, which Marcus considers a character of generic importance, *C. conirostris* is very similar to *T. orbiculare*, and the occurrence of the Brazilian variety suggests that we have here a somewhat complex species and that the genus *Clotenia* is untenable.

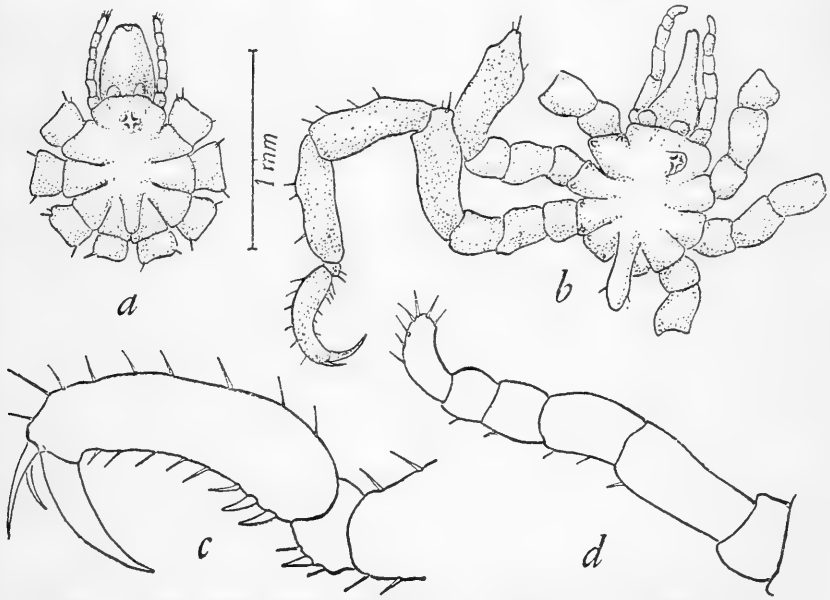

FIGURE 49.—*a*, *Tanystylum orbiculare* Wilson; *b–d*, *T. calicirostre* Schimkewitsch; *b*, Dorsal view; *c*, tarsus and propodus; *d*, palpus.

Perhaps the European and Brazilian forms are geographical varieties of *T. orbiculare*. In the Brazilian form, however, the segmentation of the third and fourth joints of the palpi is indistinct but not completely obliterated, whereas in the European *C. conirostris* the palpi have lost yet another joint. None of the published figures indicate this character very clearly, and without comparative material from Europe it seems best to consider *C. conirostris* at least specifically distinct from *T. orbiculare*. Unfortunately none of the Texas material seems to be sexually mature, but it is not improbable that mature specimens will show transitional relationships between the North and South American varieties.

Distribution.—Long Island to Brazil, Tex. Represented in the Woods Hole Oceanographic Institution fouling collections from eastern Florida and the Bahamas.

TANYSTYLUM CALICIROSTRE Schimkewitsch

FIGURE 49, *b–d*

Tanystylum calicirostre SCHIMKEWITSCH, 1889, pp. 331–333, figs. 5–7.

Record of collection.—Bermuda, 1901, A. E. Verrill coll., 1 female (Y. P. M. No. 7305).

This specimen agrees with the original description except that the spines on the legs and palpi are smaller and less numerous, and the dorsal trunk tubercles are apparently smaller.

Family COLOSSENDEIDAE Hoek, 1881

A family of large, deep-water forms with very long legs, 9- or 10-jointed palpi, and a large proboscis. Ovigers are 10-joined, with a terminal claw and spines on the terminal segments, present in both sexes.

It is represented in western Atlantic waters by five or six species of *Colossendeis*, and the 10-legged *Pentacolossendeis*, which resembles *Colossendeis* in all other details except its extra pair of legs. Practically nothing is known of the habits of these deep-water pycnogonids, and their early development is still a mystery. Egg-bearing males have never been found, although occasional specimens with adherent bodies or capsules attached to the legs, which might be egg capsules, have been observed (*cf.* Hoek, 1881, pp. 65, 143; and Cole, 1909, pp. 190–191, pl. 3, figs. 11–12).[28]

1. Four pairs of legs ..... **Colossendeis** (p. 268)
   Five pairs of legs ..... **Pentacolossendeis** (p. 275)

Genus COLOSSENDEIS Jarzynsky, 1870

Chelifores lacking in adults (but occasionally persistent in nearly mature specimens). Palpi 9-jointed. Ovigers 10-jointed, with terminal claw and spines on terminal segments. Tarsus and propodus tapering. Key to western Atlantic species:

1. Terminal claw very short (shorter than propodus); antepenult joint of palpus as long or longer than succeeding joint 2
   Terminal claw nearly as long as propodus; antepenult joint of palpus very short ..... **angusta** (p. 269)
2. Proboscis thick, spindle-shaped or clavate, or curved downward, not twice as long as trunk 3
   Proboscis very slender, twice as long as trunk, curved slightly upward at tip ..... **macerrima** (p. 273)

[28] Ovigerous males of *Decolopoda* are also unknown. This cannot be considered a character for uniting the Decolopodidae and Colossendeidae, however. No egg-bearing males of *Ascorhynchus armatus* have been found, and it is possible that its life history may be similar to that of *Colossendeis*.

3. Proboscis swollen at tip, which is directed downward; *or*, distal third curved ventrally 4
   Proboscis spindle-shaped, straight 5
4. Proboscis wider at tip than base; sole of propodus and tarsus with a row of spines ..... **clavata** (p. 273)
   Proboscis not wider at tip, but curved downward; without spines on tarsus and propodus ..... **michaelsarsi** (p. 274)
5. Very large, extent about 20 inches ..... **colossea** (p. 271)
   Small form of the above, extent 6–10 inches ..... **minuta** (p. 272)

COLOSSENDEIS ANGUSTA Sars

FIGURE 50, *a*

Colossendeis angusta SARS, 1877, pp. 268–269.—WILSON, 1881, pp. 243–244, pl. 3, figs. 8, 13.
Colossendeis gracilis HOEK, 1881, pp. 69–70, pl. 9, figs. 6–8; pl. 10, figs. 6, 7.
Colossendeis angusta VERRILL, 1885, p. 560.
Colossendeis gracilis S. I. SMITH, *in* Verrill, 1885, p. 560.
Colossendeis angusta SARS, 1891, pp. 140–143, pl. 15, fig. 2, *a–f*.—BOUVIER, 1917, pp. 8–9 (synonymy).—STEPHENSEN, 1933, pp. 28–30, figs. 6 (map), 7.—BOUVIER, 1937, pp. 25–26.—CALMAN, 1938, pp. 148–149.
Colossendeis gracilis MARCUS, 1940b, p. 110.
Colossendeis angusia NEEDLER, 1943, p. 5, fig. 2, *a–d*.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2041	July 30, 1883	39 22 50	68 25 00	1,608	2
2042	July 30, 1883	39 33 00	68 26 45	1,555	1
2043	July 30, 1883	39 49 00	68 25 30	1,467	1
2050	Aug. 1, 1883	39 42 50	69 21 20	1,050	1
2057	Aug. 30, 1883	42 01 00	68 00 30	86	1
2074	Sept. 3, 1883	41 43 00	65 21 50	1,309	1
2076	Sept. 4, 1883	41 13 00	66 00 50	906	1
2093	Sept. 21, 1883	39 42 50	71 01 20	1,000	1
2102	Nov. 5, 1883	38 44 00	72 38 00	1,209	2
2103	Nov. 5, 1883	38 47 20	72 37 00	1,091	1
2105	Nov. 6, 1883	37 50 00	73 03 50	1,395	2
2106	Nov. 6, 1883	37 41 20	73 03 20	1,497	1
2111	Nov. 11, 1883	35 09 50	74 57 40	938	1
2115	Nov. 11, 1883	35 49 30	74 34 45	843	1
2173	July 21, 1884	37 57 00	72 34 00	1,600	2
2193	Aug. 5, 1884	39 44 30	70 10 30	1,122	2
2195	Aug. 5, 1884	39 44 00	70 03 00	1,058	1
2196	Aug. 6, 1884	39 35 00	69 44 00	1,230	5
2205	Aug. 20, 1884	39 35 00	71 18 45	1,073	2
2209	Aug. 21, 1884	39 34 45	71 31 30	1,080	2
2210	Aug. 21, 1884	39 37 45	71 18 45	991	2
2211	Aug. 21, 1884	39 35 00	71 18 00	1,064	2
2217	Aug. 23, 1884	39 47 20	69 34 15	924	1
2221	Sept. 6, 1884	39 05 30	70 44 30	1,525	1
2222	Sept. 6, 1884	39 03 15	70 50 45	1,537	6
2231	Sept. 12, 1884	38 29 00	73 09 00	965	1
2232	Sept. 12, 1884	38 37 30	73 11 00	243	1
2430	June 23, 1885	42 58 30	50 50 00	179	1
2469	July 4, 1885	44 58 37	56 20 45	201	1
2470	July 4, 1885	44 47 00	56 33 45	224	2

ALBATROSS RECORDS—continued

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2471	July 4, 1885	44 34 00	56 41 45	218	5
2534	July 15, 1885	40 01 00	67 29 15	1,234	2
2535	July 15, 1885	40 03 30	67 27 15	1,149	1
2550	Aug. 9, 1885	39 44 30	70 30 45	1,081	6
2562	Aug. 11, 1885	39 15 30	71 25 00	1,434	2
2563	Aug. 11, 1885	39 18 30	71 23 30	1,422	1
2564	Aug. 11, 1885	39 22 00	71 23 30	1,390	5
2571	Sept. 1, 1885	40 09 30	67 09 00	1,356	6
2572	Sept. 2, 1885	40 29 00	66 04 00	1,769	2
2573	Sept. 2, 1885	40 34 18	66 09 00	1,742	4
2575	Sept. 3, 1885	41 07 00	65 26 30	1,710	1
2682	July 16, 1886	39 38 00	70 22 00	1,004	4
2684	July 17, 1886	39 35 00	70 54 00	1,106	2
2706	Aug. 27, 1886	41 28 30	65 35 30	1,188	2
2710	Aug. 28, 1886	40 06 00	68 01 30	984	1
2711	Sept. 16, 1886	38 59 00	70 07 00	1,544	1
2725	Oct. 24, 1886	36 34 00	73 48 00	1,374	2
2731	Oct. 25, 1886	36 45 00	74 28 00	781	1
2732	Oct. 26, 1886	37 27 00	73 33 00	1,152	3
2748	Sept. 19, 1887	39 31 00	71 14 30	1,163	1

This is the commonest species of the genus in western Atlantic waters, usually at depths from 900 to 1,700 fathoms. There are several records from around 200 fathoms, and one (*Albatross* station 2057) from 86 fathoms. This specimen is about one-third as large as the usual size. The predominant types of bottom from which this species was taken by the *Albatross* are globigerina ooze and green mud.

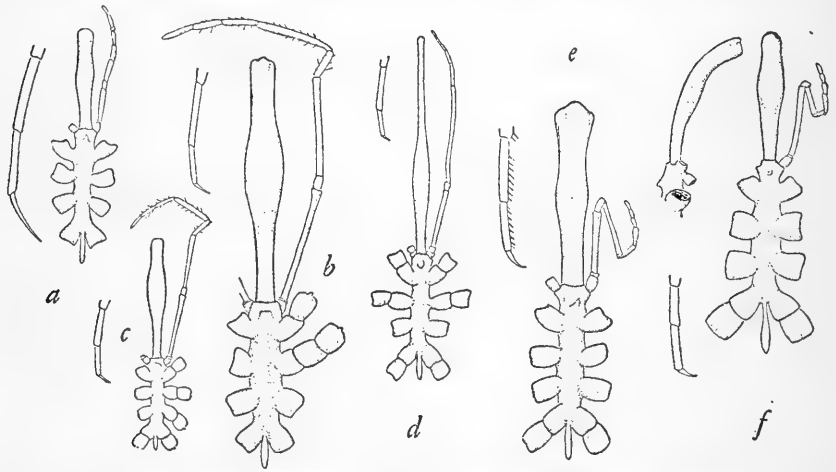

FIGURE 50.—*a*, *Colossendeis angusta* Sars; *b*, *C. colossea* Wilson; *c*, *C. minuta* Hoek; *d*, *C. macerrima* Wilson; *e*, *C. clavata* Meinert; *f*, *C. michaelsarsi* Olsen. (*a*, × 2; all others natural size.)

Distribution.—A eurybathic species of the Arctic and deep Polar Basin (Stephensen); deep North Atlantic. According to the suggested synonymies of Bouvier and Calman, it is a world-wide deep-sea species of the Atlantic, Pacific, and Indian Ocean basins. Stephensen remarks that it is not found "from waters east of America abt. 40° to 66° N." Several of the above records are near 44° and similar intensive dredging would probably reveal its presence farther north along the edge of the continent.

COLOSSENDEIS COLOSSEA Wilson

FIGURE 50, *b*

Colossendeis colossea WILSON, 1881, pp. 244–246, pl. 1, fig. 1; pl. 3, figs. 5–7.—VERRILL, 1885, p. 560, fig. 169.—BOUVIER, 1917, pp. 13–16, pl. 1, fig. 2; pl. 2, fig. 1 (synonymy, color plates).—BOUVIER, 1937, pp. 31–32.—HEDGPETH, 1943b, pp. 55–56.—NEEDLER, 1943, p. 4, fig. 1, *a-c*.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2050	Aug. 1, 1883	39 42 50	69 21 20	1,050	1
2051	do	39 41 00	69 20 20	1,106	5
2052	do	39 40 05	69 21 25	1,098	2
2072	Sept. 2, 1883	41 53 00	65 35 00	858	1
2077	Sept. 4, 1883	41 09 40	66 02 20	1,255	4
2078	do	41 11 30	66 12 20	499	2
2094	Sept. 21, 1883	39 44 30	71 04 00	1,022	5
2103	Nov. 5, 1883	38 47 20	72 37 00	1,091	1
2110	Nov. 9, 1883	35 12 10	74 57 15	516	3
2111	Nov. 11, 1883	35 09 50	74 57 40	938	3+
2115	do	35 49 30	74 34 45	843	2+
2192	Aug. 5, 1884	39 46 30	70 14 45	1,060	2
2193	do	39 44 30	70 10 30	1,122	4
2195	do	39 44 00	70 03 00	1,058	2
2196	Aug. 6, 1884	39 35 00	69 44 00	1,230	18
2205	Aug. 20, 1884	39 35 00	71 18 45	1,073	4
2209	Aug. 21, 1884	39 34 45	71 31 30	1,080	7
2210	do	39 37 45	71 18 45	991	6
2217	Aug. 23, 1884	39 47 20	69 34 15	924	2
2220	do	39 43 30	69 23 00	1,054	2
2230	Sept. 12, 1884	38 27 00	73 02 00	1,168	1
2231	do	38 29 00	73 09 00	965	1
2530	July 14, 1885	40 53 30	66 24 00	956	7
2532	do	40 34 30	66 48 00	705	2
2533	July 15, 1885	40 16 30	67 26 15	828	16+
2550	Aug. 9, 1985	39 44 30	70 30 45	1,081	7
2681	July 16, 1886	39 43 00	70 29 00	990	3+
2683	July 17, 1886	39 33 00	70 50 00	887	1
2684	do	39 35 00	70 54 00	1,106	1
2710	Aug. 23, 1886	40 06 00	68 01 30	984	12
2725	Oct. 24, 1886	36 34 00	73 48 00	1,374	1
2727	do	36 35 00	74 03 30	1,239	3
2728	Oct. 25, 1886	36 30 00	74 33 00	859	4
2731	do	36 45 00	74 28 00	781	1
2734	Oct. 26, 1886	37 23 00	73 53 00	841	1
2739	Sept. 17, 1887	37 34 30	37 58 00	811	1

ATLANTIS RECORDS (specimens in M. C. Z. identified by F. A. Chace)

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
(1)	Aug. 11, 1937	39 28	71 58	640	2
(2)	Aug. 3, 1938	37 43	73 40	1,105	1
3990	Aug. 14, 1940	38 05	73 40	990	1

Colossendeis colossea is the largest pycnogonid in the North Atlantic; its bathymetric range off the eastern United States is roughly 500 to 1,400 fathoms. It is a bright orange-scarlet in life. Though not so widely distributed as *C. angusta*, it is occasionally taken in greater numbers at individual stations.

Distribution.—Possibly a world-wide species of the deeper ocean basins.

COLOSSENDEIS MINUTA Hoek

FIGURE 50, *c*

Colossendeis minuta HOEK, 1881, pp. 73–74, pl. 10, figs. 12–14.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2093	Sept. 21, 1883	39 42 50	71 01 20	1,000	1
2728	Oct. 25, 1886	36 30 00	74 33 00	859	1
2734	Oct. 26, 1886	37 23 00	73. 53 00	841	1
2735	do	37 23 00	74 02 00	811	1—

ATLANTIS RECORD (M. C. Z. No. 12219)

(3)	July 26, 1939	40 05	68 05	1,105–1,135	1

Except for its smaller size, this species is very close to *Colossendeis colossea* and may be a dwarf variety of that species. Hoek's specimen was taken by the *Challenger* at station 50 (lat. 42°08′ N, long. 63°39′ W; 1,250 fathoms, south of Halifax, Nova Scotia). The only intermediate form in the collection is a specimen from *Albatross* station 2725, in which the trunk and proboscis are as large as full-grown *C. colossea*, but the legs are about two-thirds as long. This appears to be an abnormal *colossea* and has been referred to that species. The specimens identified as *C. minutea* are perfectly proportioned, and at least one (*Albatross station* 2735) appears to be mature. This specimen is about 25 cm. in extent, which is about half the size of the average *C. colossea*.

COLOSSENDEIS MACERRIMA Wilson

FIGURE 50, *d*

Colossendeis macerrima WILSON, 1881, pp. 246–247, pl. 1, fig. 2; pl. 4, figs. 9–12; pl. 5, fig. 32.——VERRILL, 1885, p. 560, fig. 170.—BOUVIER, 1917, p. 10, pl. 1, fig. 1; pl. 3, figs. 1, 2 (synonymy).—CALMAN, 1923, pp. 267–268.—BOUVIER, 1937, pp. 30–31.

Colossendeis gigas-leptorhynchus BOUVIER, 1937, pp. 32–33.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2072	Sept. 2, 1883	41 53 00	65 35 00	858	2
2083	Sept. 5, 1883	40 26 40	67 05 15	959	1
2093	Sept. 21, 1883	39 42 50	71 01 20	1,000	1
2115	Nov. 11, 1883	35 49 30	74 34 45	843	3
2205	Aug. 20, 1884	39 35 00	71 18 45	1,073	1
2530	July 14, 1885	40 53 30	66 24 00	956	3
2533	July 15, 1885	40 16 30	67 26 15	828	1
2589	Sept. 21, 1885	38 55 00	72 50 30	231	1
2678	May 6, 1886	32 40 00	76 40 30	731	2
2725	Oct. 25, 1886	36 30 00	74 33 00	859	1
2734	Oct. 26, 1886	37 23 00	73 53 00	841	1

OTHER RECORDS

Fish Hawk 1092	Aug. 11, 1882	39 53	69 47	317	1
Wm. Beebe 115 (net 157)	June 8, 1929	Bermuda circle [center, 32°12′ N., 64°36′ W.]		1, 100 (deep tow)	1 juv.
Atlantis 24	Apr. 14, 1937	"Gulf, no label"		1,000 meters	1 juv.

This species is easily identified by its long proboscis.

Distribution.—Possibly the Atlantic, Pacific, and Indian Ocean basins. Off the eastern United States it has been taken in depths of 200 to 1,000 fathoms.

COLOSSENDEIS CLAVATA Meinert

FIGURE 50, *e*

Colossendeis clavata MEINERT, 1899, pp. 57–58, pl. 5, figs. 19, 20.—BOUVIER, 1917, pp. 9–10; 1937, p. 26, fig. 1.

A well-defined species of the North Atlantic basin. In the western Atlantic it occurs at depths around 1,000 fathoms.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of Specimens
		° ′ ″	° ′ ″	*Fathoms*	
2034	July 17, 1883	39 27 10	69 56 20	1,346	1
2051	Aug. 1, 1883	39 41 00	69 20 20	1,106	1
2072	Sept. 2, 1883	41 53 00	65 35 00	858	4
2075	Sept. 3, 1883	41 40 30	65 35 00	855	1
2076	Sept. 4, 1883	41 13 00	66 00 50	906	1
2196	Aug. 6, 1884	39 35 00	69 44 00	1,230	2
2205	Aug. 20, 1884	39 35 00	71 18 45	1,073	7
2207	do	39 35 33	71 31 45	1,061	2
2209	Aug. 21, 1884	39 34 45	71 31 30	1,080	2
2210	do	39 37 45	71 18 45	991	3

COLOSSENDEIS MICHAELSARSI Olsen

FIGURE 50, *f*

Colossendeis michaelsarsii OLSEN, 1913, pp. 4–5, figs. 1–4, pl. 1, fig. *A*.
Colossendeis arcuata BOUVIER, 1937, pp. 26–30, figs. 2–8.

Record of collection.—Albatross station 2072, Sept. 2, 1883, lat. 41°53′00″ N., long. 63°35′00″ W., 858 fathoms, 1 specimen.

Olsen's description of this species is based on a single specimen dredged by the *Michael Sars* at station 41, lat. 28°08′ N., long. 13°35′ W.; 1,365 meters (off the coast of Africa). Bouvier, apparently unaware of Olsen's paper, ascribes this species to Alphonse Milne-Edwards and considers that it dates from 1885 on the basis of the publication of a drawing in a semipopular book on marine life (H. Filhol, "La Vie au Fond des Mers," Paris, 1885). This illustration (fig. 48, p. 151) and Bouvier's drawings suggest Olsen's species. The legend in Filhol's book reads: "Colossendeis arcuatus (A. M.—Edw.) pris à 1,500 metres de profondeur, Expedition du Talisman." Bouvier gives the station as No. 33, May 17, 1883, lat. 32°34′ N., long. 9°48′ W. (Paris?), 869 fathoms. This seems to be, according to Sanderson Smith's (1889) lists, station 34, 32°31′ N., 9°48′ W., 1,350 meters. This general locality is 5° or 6° north of the *Michael Sars* station.

Had Bouvier seen Olsen's paper, it is probable that he would have persisted in trying to establish Milne-Edwards priority on the basis of the published figure, but it does not seem to me that this is adequate, especially since the species was not specifically designated as new and reasonable procedure demands that such manuscript names be rejected.

While there is some difference in the shape of the proboscis in Bouvier's drawing, it is not great enough to separate it from Olsen's species on taxonomic grounds.

Colossendeis michaelsarsi appears to be a North Atlantic basin form.

Genus PENTACOLOSSENDEIS Hedgpeth, 1943

This genus resembles *Colossendeis* in all particulars except that it has five pairs of legs. The completely segmented body of the genotype is probably a specific character, as there are several species of *Colossendeis* in which the body is completely segmented. Some of these segmented forms have been referred to *Rhopalorhynchus*, which is an uneasy genus.

PENTACOLOSSENDEIS RETICULATA Hedgpeth

FIGURE 51, *a-e*

Pentacolossendeis reticulata HEDGPETH, 1943b, pp. 56–57 (diagnosis)

RECORDS OF COLLECTIONS

Fish Hawk station 7279, Feb. 14, 1902, lat. 24°21′55″ N., long. 81°58′25″ W., Gulf Stream, off Key West, 98 fathoms, 3 females (holotype and 2 paratypes: U.S.N.M. No. 81102).

Bache station (3), Apr. 13, 1872, off San Key, Fla., 104 fathoms, 1 female (paratype: M.C.Z. No. 12235).

State University of Iowa Bahamas Expedition station 64, June 29, 1893, Pourtalès Plateau, near American Shoal Light, 110 fathoms, 1 female.

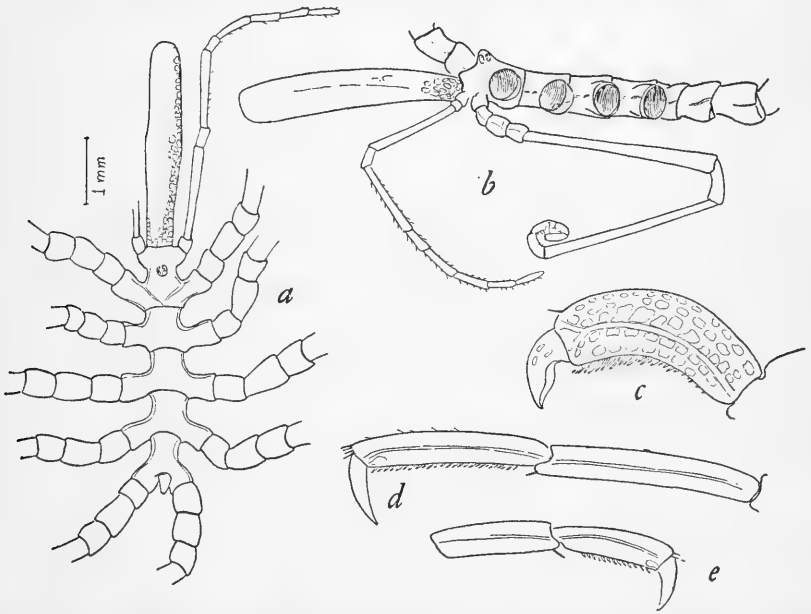

FIGURE 51.—*Pentacolossendeis reticulata* Hedgpeth: *a*, Dorsal view of holotype; *b*, lateral view; *c*, terminal joint of oviger; *d*, tarsus and propodus; *e*, tarsus and propodus of second leg (to same scale as *d*).

Description.—Trunk elongated, cylindrical, completely segmented, with annular swellings. Lateral processes separated by about their own diameter. Eye tubercle slightly higher than wide, rounded. Eyes large, lightly pigmented. Integument reticulated on proboscis,

less conspicuously so on trunk and legs. The body integument is also covered with minute tubercles.

Proboscis about as long as trunk, slightly curved, largest at tip.

Abdomen small, bluntly conical.

Palpus slender, longer than proboscis. Second joint longest, fourth slightly shorter. Sixth and seventh joints subequal, longer than fifth, eight and ninth subequal, longer than fifth. Joints 4 to 9 with small setae.

Oviger: Basal joints small, subequal. Fourth joint longest, straight, largest distally, sixth joint not quite so long as fourth. Terminal joints diminishing in size, with several rows of spines, as in *Colossendeis*. Terminal claw scoop-shaped.

Leg: Long, slender, with scattered fine setae and a prominent chitinous line extending out to the propodus. Tarsus and propodus subequal, propodus with a row of small spines on the sole. Terminal claw about three times as long as within at base, blunt.

Measurements.—As follows:

Proboscis:	*Mm.*	Fourth leg:	*Mm.*
Length	3. 1	Coxae	1. 5
Diameter	0. 6	Femur	7. 75
Trunk	3. 5	First tibia	8. 5
Cephalic segment	1. 0	Second tibia	6. 5
Third trunk segment, width	1. 5	Tarsus	1. 5
Abdomen	0. 25	Propodus	1. 25
		Terminal claw	0. 5

Remarks.—The second pair of legs of the holotype and the specimen from University of Iowa Station 64 are shorter than the other legs and of slightly less diameter. This difference is most marked in the tarsal joints (fig. 51, *d*, *e*). Genital pores seem to be present on all five pairs of second coxae of the holotype and on the last four pairs of the paratypes. They do not seem to be on the second pair of legs in the Pourtalès specimen but may not yet have developed. Such pores as could be made out seem to be too large for the male, and the sexual determination must be considered tentative.

Family PYCNOGONIDAE Wilson, 1878

Chelifores and palpi absent Oviger 6- to 9- jointed, with a large terminal claw which is considered by some to be another segment, present only in the male. The propodus is well developed, but without a heel or heavy basal spines. Members of this family are chacterized by short, knobby legs, which gives them an oval appearance. There are two genera, the octopodous *Pycnogonum* and the decapodous *Pentapycnon:*

1. Four pairs of legs ..... **Pycnogonum** (p. 277)
   Five pairs of legs ..... **Pentapycnon** (p. 281)

Genus PYCNOGONUM Brünnich, 1764

Represented in the western North Atlantic by three species. *Pycnogonum pamphorum* from Brazil is also included in the key as it may be a member of the West Indian fauna.

1. Integument without reticulation 2
   Integument reticulated ..... **reticulatum**, new species (p. 279)
2. Proboscis cylindrical or ovoid 3
   Proboscis tapering to a blunt point ..... **littorale** (p. 277)
3. Without spines on legs; proboscis cylindrical, truncate ..... **crassirostre** (p. 279)
   With a few large spines on femur and tibiae; proboscis ovoid.
   pamphorum Marcus

Mello-Leitão (1945) has proposed another Brazilian species, *Pycnogonum leticiae*, which is very close to if not indentical with *pamphorum*. The only noteworthy difference seems to be the presence of a small tubercle just behind the ocular tubercle in *leticiae*.

PYCNOGONUM LITTORALE (Ström)

FIGURE 52, *a*

Phallangium littorale STRÖM, 1762, p. 209, pl. 1, fig. 17.
Pycnogonum pelagicum STIMPSON, 1853, p. 37.—WHITEAVES, 1872, p. 347.
Pycnogonum littorale VERRILL, 1873b, p. 415.
Pycnogonum pelagicum VERRILL, 1874c, p. 502.
Pycnogonum littorale SMITH and HARGER, 1874, p. 10.—VERRILL, 1875, p. 38.—WILSON, 1878b, pp. 4–5, pl. 1, fig. 1, *a*, *b*; pl. 2, fig. 3, *a*, *b*; 1880, pp. 469–471, pl. 1, figs. 1–3; 1881, p. 242.—VERRILL, 1885, p. 560.—WHITEAVES, 1901, p. 262.—BOUVIER, 1914b, pp. 207–210.—SUMNER, OSBURN, and COLE, 1913, p. 677.—SCHIMKEWITSCH, 1930, pp. 7–15.—STEPHENSEN, 1933, p. 30, fig. 8 (map).—NEEDLER, 1943, p. 5, fig. 3, *a–d*.

ALBATROSS RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
2055	Aug. 30, 1883	42 32 00	68 17 00	99.5	1
2062–63	Aug. 31, 1883			141–150	3
2183	Aug. 2, 1884	39 57 45	70 56 30	195	1♂, 1♀
2469	July 4, 1885	44 58 37	56 20 45	201	2♂♂, 1♀
2470	do	44 47 00	56 33 45	224	2♀♀
2506	July 8, 1885	44 26 00	62 10 00	127	1
2514	July 11, 1885	43 28 30	63 57 30	126	1♂, 1♀
2523	July 13, 1885	41 48 30	65 44 30	111	1
2526	do	41 40 45	65 46 00	121	7
2578	Sept. 4, 1885	41 20 30	68 34 30	37	1♂

Pycnogonum littorale is one of the characteristic denizens of the North Atlantic littoral. On the coast of the United States it is found from Eastport, Maine, to Long Island Sound. The local bathymetric range is from shore line to 810 fathoms. Although Stephensen listed Barbados for this species, it is not represented in the museum collec-

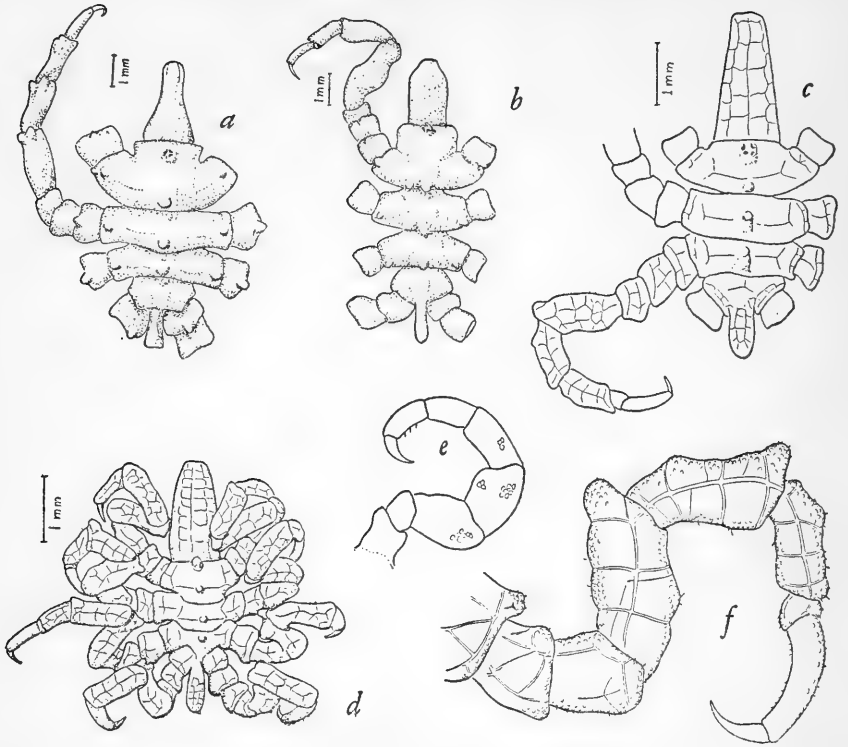

FIGURE 52.—*a*, *Pycnogonum littorale* (Ström); *b*, *P. crassirostre* Sars; *c–f*, *P. reticulatum*, new species: *c*, dorsal view of holotype; *d*, dorsal view of female specimen; *e*, oviger of holotype; *f*, leg of holotype.

tions from the West Indies. On the eastern shore of the Atlantic it occurs as far south as Morocco.

Schimkewitsch suggested that *Pycnogonum stearnsi*, the common *Pycnogonum* of the Pacific coast of North America from Alaska to San Diego, might be a variety of *P. littorale*. His reasons were based on Cole's (1904a, p. 294) comparative table of differences between the two species. Schimkewitsch considered these differences secondary and suggested that transitional types might be expected in a large series.

While I do not pretend that the comparative material at my disposal is extensive (58 specimens of *P. littorale* and 25–30 specimens of *P. stearnsi*), I have noticed no such transitional types. Aside from the considerable difference in size, the most consistent difference between the two species is the shape of the proboscis. This always has the appearance of a flat ellipse from above in *P. stearnsi*, never the downward-pointing funnel shape which is characteristic of *P. littorale*. Bouvier mentions no pronounced variation in the shape of the proboscis in a series of 2,307 specimens of *P. littorale* he examined.

PYCNOGONUM CRASSIROSTRE Sars

FIGURE 52, *b*

Pycnogonum crassirostre SARS, 1888, No. 2; 1891, p. 12, pl. 1, fig. 1, *a–h*.—STEPHENSEN, 1933, pp. 30–32, fig. 8 (map).

FISH HAWK RECORDS

Station No.	Date	Lat. N.	Long. W.	Depth	Number of specimens
		° ′ ″	° ′ ″	*Fathoms*	
945	Aug. 9, 1881	39 58 00	71 13 00	207	1
1154	Oct. 4, 1882	39 55 31	70 39	193	6

ALBATROSS RECORDS

2183	Aug. 2, 1884	39 57 45	70 56 30	195	2♀♀
2185	Aug. 2, 1884	40 00 45	74 54 15	129	1

[Three of these records, stations 945, 1154, and 2185, have been previously published by Stephensen (p. 31) but without station numbers.]

This species is smaller than *Pycnogonum littorale* and is distinguished from that species by the shape of the proboscis.

According to Stephensen, "This species seems to prefer deeper water than *P. littorale*" (p. 31). This is not altogether correct, since *P. littorale* has been dredged from greater depths (to 810 fathoms in American waters) than *P. crassirostre*. It would be more accurate to say that *P. crassirostre* is not known to be a littoral species but appears to be restricted to a bathymetric range of 50–200 fathoms.

PYCNOGONUM RETICULATUM, new species

FIGURE 52, *c–f*

Pycnogonum sp. HEDGPETH, 1947, p. 13, fig. 5, *c*.

Types.—Holotype (male): U.S.N.M. No. 13545, Key West, Fla., 1885, Henry Hemphill coll.[29]

Paratype (female): U.S.N.M. No. 9152, Key West, Fla., April 15–27, 1884 (*Albatross*).

Other records.—Key West, Fla., A. S. Packard coll., 1 female (M. C. Z.), Tortugas, Fla., July–August 1925, H. Boschma coll., from surface of *Maeandra areolata*, 1 female; El Salvador, J. M. Dow coll., 1 male.

Description.—Trunk compact, lateral processes touching. Three dorsal trunk tubercles, not quite so tall as eye tubercle. Eye tubercle

[29] An eminent amateur conchologist in his day, suitably remembered in scientific literature by a species of hermit crab and a genus of little black slugs. His neighbors allege that he inadvertently released a lot of large edible snails in their gardens. The ducks enjoyed them. An obituary note, with portrait and bibliography, will be found in Trans. San Diego Soc. Nat. Hist., vol. 2, No. 1, pp. 58–60, 1914.

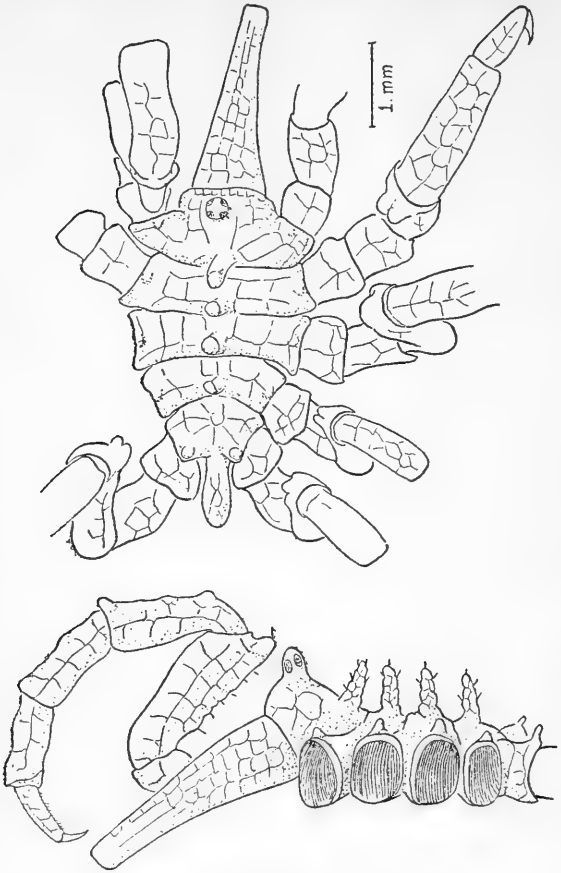

FIGURE 53.—*Pentapycnon geayi* Bouvier.

large, diameter about one-third its height. Integument heavily reticulated by broad chitinous bands, and adorned with numerous small rounded tubercles. There is a small seta at the apex of many of the small tubercles.

Proboscis nearly as long as trunk, tapering slightly from base to tip. Tip broad, obtuse, directed downward.

Abdomen as long as last trunk segment, subcylindrical, rounded at tip.

Oviger 7-jointed, third and fourth joints almost as broad as long. Terminal spine about two-thirds as long as seventh joint.

Leg thick, knobby. Femur not quite so long as the sum of the coxae, tibiae subequal. Tarsus short but distinct. Propodus slightly curved, with a row of weak spines on the sole. Terminal claw less than half as long as the propodus.

Measurements.—As follows:

	Mm.	Third leg:	*Mm.*
Proboscis	2. 1	Coxae	1. 5
Diameter at base	1. 0	Femur	1. 25
Trunk	3. 0	First tibia	1. 0
Cephalic segment	1. 0	Second tibia	0. 75
Second lateral process, width	2. 0	Tarsus	0. 1
Abdomen	0. 9	Propodus	0. 9
		Terminal claw	0. 5

Remarks.—Although Hilton's figure (1942b, pl. 48) of his *Pycnogonum panamum* is suggestive of this species, it is actually quite different. The lateral processes of Hilton's species are well separated, the legs slender, and the size of the type specimen is at least half again as large as the specimens of *P. reticulatum*. The integument of *P. panamum* does not have the numerous small tubercles found in this species.

The name for this species was proposed (on labels) by Dr. Leon J. Cole.

Genus PENTAPYCNON Bouvier, 1910

Like *Pycnogonum*, but with five pairs of legs. Two species are known, the tropical American *Pentapycnon geayi*, and the Antarctic *P. charcoti*. *Pentapycnon charcoti* is adorned with large tubercles, which give it a nodular appearance. The relationships of the pentamerous species of *Pentapycnon* with the "normal" Pycnogonums is discussed in some detail in another paper (Hedgpeth, 1947).

PENTAPYCNON GEAYI Bouvier

FIGURE 53

Pentapycnon geayi BOUVIER, 1911a, pp. 491–494; 1911b, p. 1140; 1913, p. 161.

Record of collection.—Johnson-Smithsonian Expedition station 16, Feb. 3, 1933, north of Puerto Rico, lat. 18°31′ N., long. 66′10′15″ W., 38 fathoms, 1 female.

Previously recorded from the vicinity of Cayenne, French Guiana.

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746333—47 (Face p. 290) No. 1

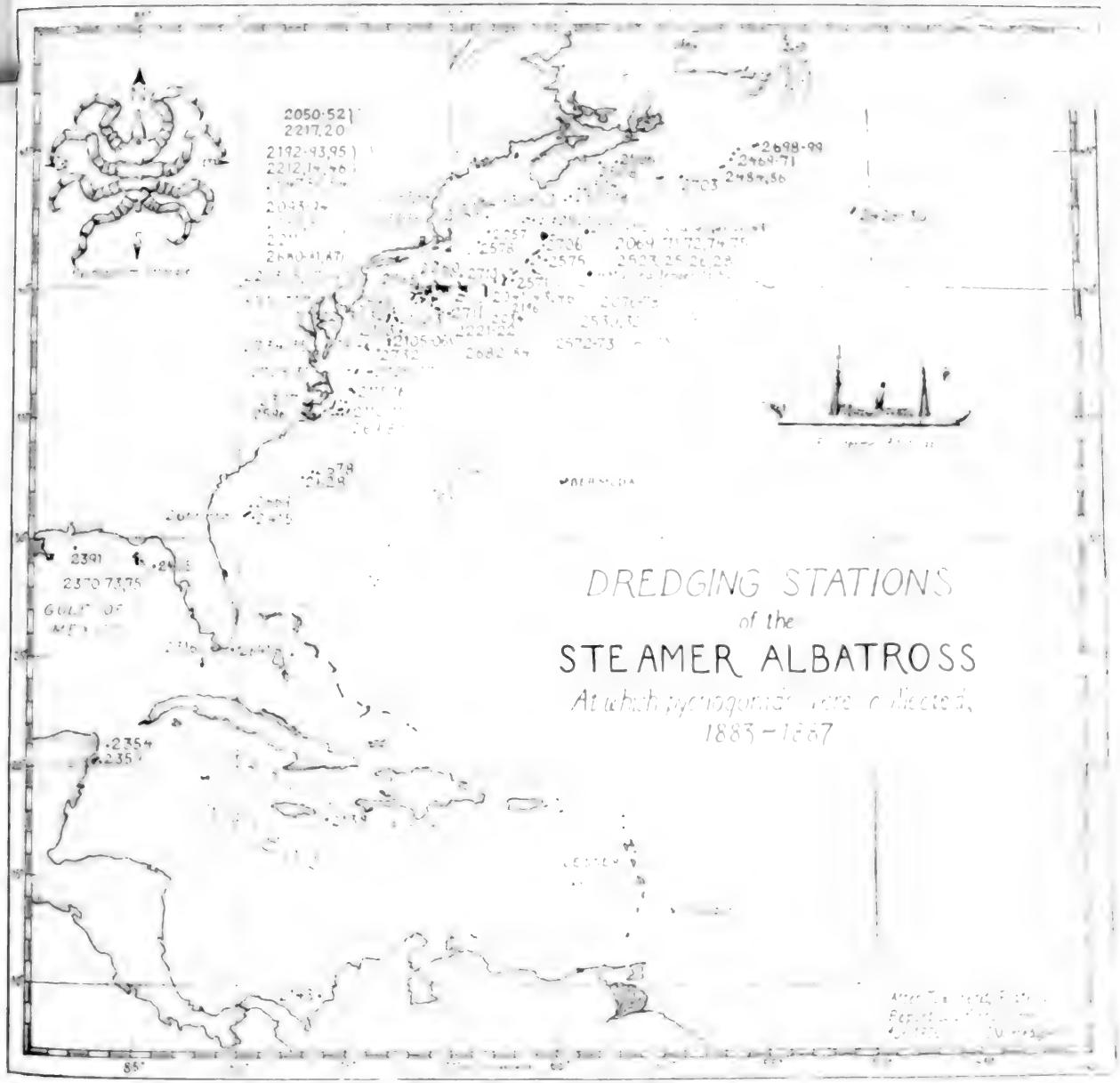

CHART I. Dredging stations of the steamer Albatross at which hydrographic work was executed, 1883–1887

CHART 2 Statement [illegible] the North Atlantic [illegible]

APPENDIX

The station records cataloged in the following tables have been assembled from a number of sources, but particularly Sanderson Smith's station lists for the North Atlantic (1889) and Townsend's dredging records for the *Albatross* (1901). While it is realized that these lists are incomplete, all the published records from major reports on North Atlantic pycnogonids have been included, together with a few individual records of particular interest. Because of the predominantly Arctic character of the records, the inaccessibility of many of the papers, and the taxonomic vagaries indulged in by the Russians (Schimkewitsch, 1930, lumps *Nymphon spinosissimum* and *hirtipes* as *N. spinosum*, and more recent workers are suggesting such species as *N. brevitarse* and *rubrum* as varieties of *grossipes*), their reports have been omitted from this compilation.

Records of the dredging work of the United States Fish Commission in New England waters before 1877 have not been included inasmuch as few of the collections were referred to station numbers on the original labels. The *Speedwell* records have been compiled from a reexamination of the original material, now in the Peabody Museum. Most of this material has previously been reported by Wilson (1880) but without reference to station numbers. It is not practical to indicate these stations on a small-scale chart; all the dredging stations of the Fish Commission up to 1886 will be found in the charts accompanying Sanderson Smith's lists and should be readily accessible to American students.

Errors are inevitable in a compilation of this type, and I can only hope that they are neither numerous nor serious. Several obvious errors in Norman's review (1908) have been corrected to agree with the positions given by Sanderson Smith. Unfortunately, salinity data are unavailable for most of these stations, and so they have been omitted from the remainder. Reference to further information concerning temperature and salinity data of many expeditions in the North Atlantic is published in "International Aspects of Oceanography" (National Academy of Sciences, 1937, pp. 7–19).

Inasmuch as charts of station positions are included in the Norwegian North Atlantic, *Ingolf*, and *Godthaab* reports, and the distribution of the Arctic species seems to be well established, charts of the occurrence of pycnogonids in northern waters have not been prepared. The distribution of many of the Arctic species has been charted in Stephenson's various papers. From Chart 2 of stations in the North Atlantic, it will be seen that there are vast areas from which we have no records of pycnogonids. There are no collections reported for the area between latitudes 10° to 40° N. and longitudes 30° to 60° W., except the *Challenger* station 70, and the paucity of

records in midocean between latitudes 50° and 60° N. is curious in view of the abundant records immediately north of 60°. It is unfortunate that any material which may have been collected by the *Dana* in 1920–22 has not been published, since that vessel ran several series of stations across the middle of the Atlantic and into the Caribbean, and its collections might be expected to fill out some of the blank spaces on the chart. The intensity of dredging operations in the vicinity of the British Isles is not indicated on the chart, inasmuch as much of the work was published in obscure journals of provincial natural-history societies inaccessible to the author. Much of this work has been summarized by Norman (1908). It should be noted that several stations of the *Michael Sars* expedition of 1910 were made off the coast of Africa, a fact evidently overlooked by Giltay (1937) in drawing up his key to West African Nymphons.

As Stephensen (1933) has shown in his reexamination of the material collected by the *Ingolf*, some of the older identifications of critical species are erroneous. On the whole, however, the distribution of these species is probably well established, and reexamination of all the existing collections would not materially alter the picture.

CONTENTS OF THE APPENDIX TABLES

CHARTS

ABBREVIATIONS USED IN THE TABLES

bil. biloculina	g. gravel	rd. red
bk. black	glob. globigerina	rky. rocky
br. brown	gn. green	s. sand
brk. broken	gy. gray	sa. sabulous (sandy)
bu. blue	hd. hard	sft. soft
c. clay	lt. light	sh. shells
co. coral	m. mud	sp. specks
crs. coarse	nod. nodules	st. stones
dd. dead	null. nullipores	stf. stiff
dk. dark	oz. ooze	vol. volcanic
fn. fine	p. pebbles	wh. white
for. Foraminifera	r. rock	yl. yellow

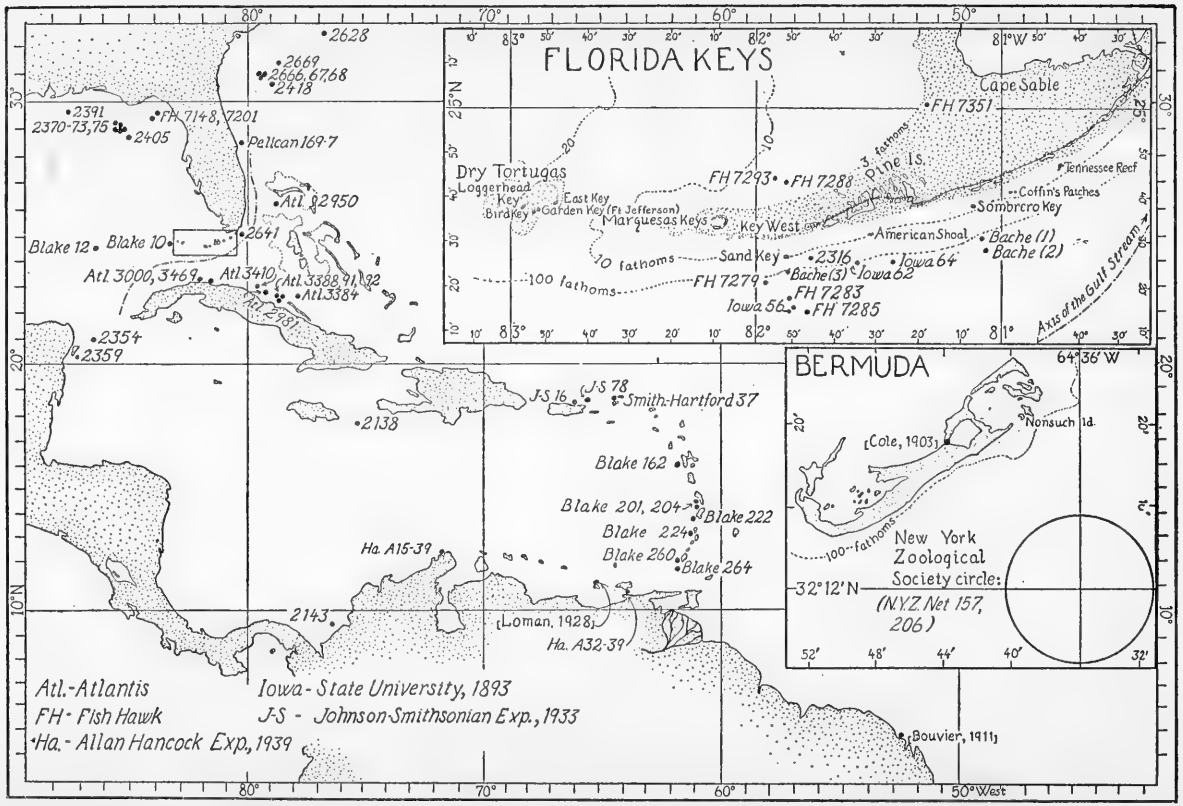

CHART 3.—Stations for pycnogonids in the Caribbean and the Florida keys.

APPENDIX TABLE I

DREDGING STATIONS OF THE ALBATROSS AT WHICH PYCNOGONIDS WERE COLLECTED, 1883–1887

Station No.	Date	Lat. N.	Long. W.	Depth	Temp. ° F.	Type of bottom	Species of pycnogonids
	1883	° ′ ″	° ′ ″	*Fathoms*			
2034	July 17	39 27 10	69 56 20	1,346	38.0	glob. oz	*Colossendeis clavata*
2041	July 30	39 22 50	68 25 00	1,608	38.0	glob. oz	*Colossendeis angusta*
2042	do	39 33 00	68 26 45	1,555	38.5	glob. oz	*Colossendeis angusta*
2043	do	39 49 00	68 25 30	1,467	38.5	glob. oz	*Colossendeis angusta*
2046	July 31	40 02 49	68 49 00	407	40.0	bu. m	*Nymphon strömi; Pallenopsis longirostris*
2050	Aug. 1	39 42 50	69 21 21	1,050	44.5	glob. oz	*Colossendeis angusta, colossea*
2051	do	39 41 00	69 20 20	1,106	39.0	bu. m., glob. oz	*Colossendeis colossea, clavata*
2052	do	39 40 05	69 21 25	1,098	45.0	glob. oz	*Colossendeis colossea*
2055	Aug. 30	42 32 00	68 17 00	99.5		bu. m., s., crs. g	*Pycnogonum littorale*
2057	do	42 01 00	68 00 30	86		crs. s., bk. sp., brk. sh	*Colossendeis angusta*
2062	Aug. 31	42 17 00	66 37 15	150	42.0	s., g	*Nymphon grossipes, strömi; Pycnogonum littorale*
2063	do	42 23 00	66 23 00	141	46.0	s., crs. g	*Pycnogonum littorale*
2064	do	42 25 40	66 08 35	122		crs. s., g	*Nymphon strömi*
2067	Sept. 1	42 15 25	65 48 40	122	46.0	s., g	*Nymphon macrum*
2069	do	41 54 50	65 48 35	101	42.0	s., st., g., p. & c	*Nymphon macrum*
2071	do	41 56 20	65 48 40	113		p. & c	*Nymphon macrum*
2072	Sept. 2	41 53 00	65 35 00	858	39.0	gy. m	*Nymphon tenellum; Colossendeis colossea, macerrima, clavata, michaelsarsi*
2074	Sept 3	41 43 00	65 21 50	1,309	40.0	m., st	*Ascorhynchus armatus; Colossendeis angusta*
2075	do	41 40 30	65 35 00	855	39.0	glob. oz	*Colossendeis clavata*
2076	Sept. 4	41 13 00	66 00 50	906		bu. m	*Colossendeis angusta, clavata*
2077	do	41 09 40	66 02 20	1,255	39.0	bu. m	*Ascorhynchus armatus; Colossendeis colossea*
2078	do	41 11 30	66 12 20	499	40.0	gy. m., s	*Callipallene acus, Colossendeis colossea*
2083	Sept. 5	40 26 40	67 05 15	959	40.0	gy. m	*Colossendeis macerrima*
2084	do	40 16 50	67 05 15	1,290	40.0	bu. m., s	*Ascorhynchus armatus*
2093	Sept. 21	39 42 50	71 01 20	1,000	39.0	for., s., m	*Colossendeis angusta, minuta, macerrima*
2094	do	39 44 30	71 04 00	1,022	38.5	for., s., m	*Colossendeis colossea*
2102	Nov. 5	38 44 00	72 38 00	1,209	39.0	glob. oz	*Colossendeis angusta*
2103	do	38 47 20	72 37 00	1,091	39.0	glob. oz	*Colossendeis angusta, colossea*

APPENDIX TABLE I—Continued

Station No.	Date	Lat. N.	Long. W.	Depth	Temp. ° F.	Type of bottom	Species of pycnogonids
	1883	° ′ ″	° ′ ″	*Fathoms*			
2105	Nov. 6	37 50 00	73 03 50	1,395	41.0	glob. oz	*Colossendeis angusta*
2106	do	37 41 20	73 03 20	1,497	42.5	glob. oz	*Colossendeis angusta*
2110	Nov. 9	35 12 10	74 57 15	516	40.0	bu. m	*Colossendeis colossea*
2111	Nov. 11	35 09 50	74 57 40	938		gn. m	*Nymphon tenellum; Colossendeis angusta, colossea*
2115	do	35 49 30	74 34 45	843	39.0	m., fn. s	*Nymphon macrum; Colossendeis angusta, colossea, macerrima*
2116	do	35 45 23	74 31 25	888	39.0	bu. m., fn. s	*Nymphon macrum*
	1884						
2138	Feb. 29	17 44 05	75 39 00	23		co., brk. sh	*Pallenopsis schmitti*
2143	Mar. 23	9 30 45	76 25 30	155		gn. m	*Pallenopsis schmitti*
2173	July 21	37 57 00	72 34 00	1,600	37.0	glob. oz	*Colossendeis angusta*
2183	Aug. 2	39 57 45	70 56 30	195	44.5	gn. m., s	*Pycnogonum littorale, crassirostre*
2185	do	40 00 45	74 54 15	129	51.0	gn. m., s	*Pycnogonum crassirostre*
2192	Aug. 5	39 46 30	70 14 45	1,060	38.6	gy. oz	*Colossendeis colossea*
2193	do	39 44 30	70 10 30	1,122	38.4	gn. m	*Colossendeis angusta, colossea*
2195	do	39 44 00	70 03 00	1,058	38.4	gn. m	*Colossendeis angusta, colossea*
2196	Aug. 6	39 35 00	69 44 00	1,230	38.0	gn. m	*Colossendeis angusta, colossea, clavata*
2203	Aug. 19	39 34 15	71 41 15	705	38.9	gn. m	*Paranymphon spinosum*
2205	Aug. 20	39 35 00	71 18 45	1,073	38.1	gy. oz	*Ascorhynchus armatus; Colossendeis colossea, angusta, macerrima, clavata*
2207	do	39 35 33	71 31 45	1,061	38.6	gn. m	*Colossendeis clavata*
2209	Aug. 21	39 34 45	71 31 30	1,080	39.5	gn. m., s	*Colossendeis angusta, colossea, clavata*
2210	do	39 37 45	71 18 45	991	38.1	glob. oz	*Colossendeis angusta, colossea, clavata*
2211	do	39 35 00	71 18 00	1,604	38.3	gy. oz	*Colossendeis angusta*
2212	Aug. 22	39 59 30	70 30 45	428	40.0	gn. m	*Nymphon longitarse; Achelia brevichelifera.*
2214	do	35 57 00	70 32 00	475	39.5	gn. m	*Paranymphon spinosum*
2217	Aug. 23	39 47 20	69 34 15	924	38.1	gy. m	*Colossendeis angusta, colossea*
2220	do	39 43 30	69 23 00	1,054	38.3	gy. m	*Colossendeis colossea*
2221	Sept. 6	39 05 30	70 44 30	1,525	36.9	gy. oz	*Colossendeis angusta*
2222	do	39 03 15	70 50 45	1,537	36.9	gy. oz	*Colossendeis angusta*

2230	Sept. 12	39	27	00	73	02	00	1,168	36.8	gy. oz	*Colossendeis colossea*
2231	do	38	29	00	73	09	00	965	36.8	gy. oz	*Colossendeis angusta, colossea*
2232	do	38	37	30	73	11	00	243	42.8	gn. m	*Colossendeis angusta*
2246	do	39	56	45	70	20	30	122	48.8	gn. m	*Nymphon strömi*
2260	Sept. 28	40	13	15	69	29	15	46	50.2	gy. s	*Nymphon grossipes*
2269	Oct. 19	35	12	30	75	05	00	48	77.0	crs. gy. bk. s	*Anoplodactylus insignis*
2280	do	35	21	00	75	21	30	16		gy. s., brk. sh	*Anoplodactylus lentus*
2307	Oct. 21	35	42	00	74	54	30	43	57.3	gy. bk. s	*Anoplodactylus petiolatus*
	1885										
2316	Jan. 15	24	25	30	81	47	45	50	74.0		*Anoplodactylus lentus*
2354	Jan. 22	20	59	30	86	23	45	130		co	*Anoplodactylus lentus*
2359	Jan. 29	20	19	10	87	03	30	231	50.8	wh. co	*Ascorhynchus serratum*
2370	Feb. 17	29	18	15	85	32	00	25		crs. gy. s., brk. sh	*Anoplodactylus lentus*
2371	do	29	17	00	85	30	45	26		gy. s., brk. sh	*Anoplodactylus lentus*
2372	do	29	15	30	85	29	30	27		g	*Anoplodactylus lentus*
2373	do	29	14	00	85	29	15	25		co	*Anoplodactylus lentus*
2375	do	29	10	00	85	31	00	30		s., bk. sp., brk. sh	*Anoplodactylus lentus*
2391	Mar. 4	29	32	00	87	45	00	25		gy. s., bk. sp	*Anoplodactylus lentus*
2405	Mar. 15	28	45	00	85	02	00	30		gy. s., brk. co	*Nymphon floridanum; Anoplodactylus lentus*
2415	Apr. 1	30	44	00	79	26	00	440	45.6	co., crs. s., sh., for	*Nymphon strömi*
2428	June 23	42	48	00	50	55	30	826	38.3	gn. m	*Cordylochele malleolata*
2429	do	42	55	30	50	51	00	471	38.7	gy. m	*Nymphon spinosissimum, strömi, macrum; Cordylochele malleolata*
2430	do	42	58	30	50	50	00	179		gn. s., p	*Nymphon hirtipes; Colossendeis angusta*
2469	July 4	44	58	37	56	20	45	201	40.5	gn. m	*Colossendeis angusta; Pycnogonum littorale*
2470	do	44	47	00	56	33	45	224	40.2		*Pallenopsis longirostris; Colossendeis angusta; Pycnogonum littorale*
2471	do	44	34	00	56	41	45	218	40.4	gy. m., s	*Nymphon spinosissimum, hirtipes, tenellum, macrum; Cordylochele malleolata; Colossendeis angusta*
2484	July 5	44	20	00	57	11	15	204		fn. wh. s	*Nymphon spinosissimum*
2486	do	44	26	00	57	11	15	190	39.7	cr. s., g	*Nymphon spinosissimum*
2506	July 8	44	26	00	62	10	00	127	43.1	dk. br. m	*Pycnogonum littorale*
2508	do	44	28	30	62	56	00	72	39.7	br. m	*Nymphon hirtipes, strömi*
2514	July 11	43	28	30	63	57	30	126	43.1	bk. m	*Pycnogonum littorale*
2517	July 12	43	10	00	64	18	00	55	38.3	yl. s., bk. sp	*Nymphon strömi*
2518	do	43	05	00	64	40	30	60	38.7	st	*Nymphon strömi*
2521	do	42	30	30	65	02	00	65	42.1	s., g	*Nymphon grossipes*
2522	do	42	20	00	65	07	30	104	46.7	s., g	*Nymphon strömi*

APPENDIX TABLE I—Continued

Station No.	Date	Lat. N.	Long. W.	Depth	Temp. ° F.	Type of bottom	Species of pycnogonids
	1885	° ′ ″	° ′ ″	*Fathoms*			
2523	July 13	41 48 30	65 44 30	111	41.6	s., g., st	*Nymphon strömi; Pycnogonum littorale*
2525	do	41 49 00	65 49 30	72	43.6	s., g., brk. sh	*Nymphon grossipes*
2526	do	41 40 45	65 46 00	121		p	*Pycnogonum littorale*
2528	do	41 47 00	65 37 30	677	38.7	br. s	*Nymphon tenellum; Cordylochele malleolata*
2530	July 14	40 53 30	66 24 00	956	38.4	gy. oz	*Colossendeis colossea, macerrima*
2532	do	40 34 30	66 48 00	705	38.7	gy. m	*Colossendeis colossea*
2533	July 15	40 16 30	67 26 15	828	38.7	br. oz	*Colossendeis colossea, macerrima*
2534	do	40 01 00	67 29 15	1,234	37.8	gy. oz	*Colossendeis angusta*
2535	do	40 03 30	67 27 15	1,149	37.8	gy. oz	*Colossendeis angusta*
2547	Aug. 8	39 54 30	70 20 00	390	39.6	gn. m	*Paranymphon spinosum*
2550	Aug. 9	39 44 30	70 30 45	1,081	38.5	br. m	*Colossendeis angusta, colossea*
2554	do	39 48 30	70 40 30	445	39.6	gn. m	*Pallenopsis longirostris*
2562	Aug. 11	39 15 30	71 25 00	1,434	37.3	gy. oz	*Colossendeis angusta*
2563	do	39 18 30	71 23 30	1,422	37.4	gy. oz	*Colossendeis angusta*
2564	do	39 22 00	71 23 30	1,390	37.3	gy. oz	*Colossendeis angusta*
2571	Sept. 1	40 09 30	67 09 00	1,356	37.8	gy. glob. oz	*Callipallene acus; Colossendeis angusta*
2572	Sept. 2	40 29 00	66 04 00	1,769	37.8	gy. oz	*Colossendeis angusta*
2573	do	40 34 18	66 09 00	1,742	37.3	gy. m. oz	*Colossendeis angusta*
2575	Sept. 3	41 07 00	65 26 30	1,710	37.1	gy. oz	*Colossendeis angusta*
2578	Sept. 4	41 20 30	68 34 30	37	54.4	fn wh. s., bk. sp	*Pycnogonum littorale*
2589	Sept. 21	38 55 00	72 50 30	231	44.2	gn. m., s	*Colossendeis macerrima*
2596	Oct. 17	38 08 30	75 10 00	49		gy. s	*Anoplodactylus lentus*
2628	Oct. 21	32 24 00	76 55 30	528		yl. m	*Pallenopsis longirostris*
	1886						
2641	Apr. 9	25 11 30	80 10 00	60	69.2	co., s	*Pallenopsis schmitti*
2666	May 5	30 47 30	79 49 00	270	48.3	gy. s	*Nymphon strömi; Cordylochele longicollis; Pallenopsis forficifer*
2667	do	30 53 00	79 42 30	273	48.7	gy. s., br., sp	*Nymphon strömi; Cordylochele longicollis; Pallenopsis forficifer*
2668	do	30 58 30	79 38 30	294	46.3	gy. s., dd. co	*Pallenopsis forficifer*
2669	do	31 09 00	79 33 30	352	43.7	gy. s., dd. co	*Nymphon strömi; Pallenopsis forficifer*
2678	do	32 40 00	76 40 30	731	38.7	lt. gy. oz	*Colossendeis macerrima*

2680	July 16	39	50	00	70	26	00	555			*Paranymphon spinosum*
2681	do	39	43	00	70	29	00	990		gn. m	*Colossendeis colossea*
2682	do	39	38	00	70	22	00	1,004		gn. m. s	*Colossendeis angusta*
2683	July 17	39	33	00	70	50	00	887		br. oz	*Colossendeis colossea*
2684	do	39	35	00	70	54	00	1,106		br. c., bk. sp	*Colossendeis angusta, colossea*
2687	July 18	39	46	00	71	19	00	326		gn. m	*Nymphon strömi*
2694	Aug. 11	46	52	30	44	54	30	86		gy. s., bk. sp	*Nymphon grossipes*
2696	do	46	53	30	46	05	30	98		gy. s., bk. sp	*Nymphon grossipes, longitarse*
2698	Aug. 22	45	07	00	55	09	10	90		gy. s., bk. sp	*Nymphon strömi*
2699	do	45	04	00	55	23	00	72		co	*Nymphon grossipes; Pallenopsis longirostris*
2703	Aug. 23	44	10	00	59	02	30	140		gy. s., bk. sp	*Nymphon strömi*
2706	Aug. 27	41	28	30	65	35	30	1,188		gy. oz., for	*Ascorhynchus armatus; Colossendeis angusta*
2710	Aug. 28	40	06	00	68	01	30	984		gn. m	*Colossendeis angusta, colossea*
2711	Sept. 16	38	59	00	70	07	00	1,544		glob. oz	*Colossendeis angusta*
2725	Oct. 24	36	34	00	73	48	00	1,374		gy. oz., for	*Ascorhynchus armatus; Colossendeis angusta, colossea; macerrima*
2727	do	36	35	00	74	03	30	1,239		gy. oz	*Colossendeis colossea*
2728	Oct. 25	36	30	00	74	33	00	859		gy. oz	*Colossendeis colossea, minuta*
2731	do	36	45	00	74	28	00	781		gy. oz	*Ascorhynchus armatus; Colossendeis angusta, colossea*
2732	Oct. 26	37	27	00	73	33	00	1,152		dk. gn. m	*Colossendeis angusta*
2734	do	37	23	00	73	53	00	841		sft. gn. m	*Pallenopsis longirostris; Colossendeis colossea, macerrima, minuta*
2735	do	37	23	00	74	02	00	811		sft. gn. m	*Colossendeis minuta*
	1887										
2739	Sept. 17	37	34	30	73	58	00	811	38.2	gy. m	*Colossendeis colossea*
2748	Sept. 19	39	31	00	71	14	30	1,163	37.8	gy. m., for	*Colossendeis angusta*

APPENDIX TABLE II

CATALOG OF STATIONS AT WHICH PYCNOGONIDS HAVE BEEN COLLECTED BY VARIOUS NORTH ATLANTIC AND ARCTIC EXPEDITIONS SINCE 1869

Porcupine, 1869 (Norman, 1908. Locations for *Nymphon grossipes* not given)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1869	° ′ ″	° ′ ″ W.	*Fathoms*	°*F.*		
17		54 28	11 44	1,230			*Paranymphon spinosum*
45	July 30	51 01	11 21	458			*Pycnogonum littorale*
47	August	59 34	7 18	542			*Nymphon leptocheles*
51	do	60 06	8 14	440			*Nymphon tenellum*
52	do	60 25	8 10	384			*Boreonymphon robustum*
55	do	60 04	6 19	605			*Boreonymphon robustum; Nymphon elegans*
59	August 20	60 21	5 41	580			*Boreonymphon robustum*
61	August 24	62 01	5 19	114			*Boreonymphon robustum*
64	August 25	61 21	3 44	640			*Boreonymphon robustum; Nymphon hirtipes, stenocheir; Cordylochele malleolata*
65	August 26	61 10	2 21	345			*Boreonymphon robustum; Nymphon hirtipes*
66	do	61 15	1 44	267			*Nymphon strömi*
74	September 1	60 39	3 09	203			*Cordylochele malleolata*
78	do	60 14	4 30	290			*Nymphon hirtipes, spinosissimum*
88	September 6	59 26	8 23	705			*Nymphon hirtipes, spinosissimum*

Whiteaves, 1871 (Whiteaves, 1872, pp. 347, 349)

	1871	[Anticosti Island]					
	August	Off E. end of island		212			*Pycnogonum littorale*
	do	Off Cap Rosier		125			*Nymphon strömi*

Bache, 1872 (Hedgpeth, 1943b)

	1872	[Florida Keys]					
(1)	April 2	Off Sombrero Key					*Anoplodactylus polignaci; Ascorhynchus colei*
(2)	April 4	do		240			*Pallenopsis forficifer*
(3)	April 13	Off Sand Key		104			*Pentacolossendeis reticulata*

Challenger, 1873 (Hoek, 1881)

	1873		W.				
49	May 20	43 03	63 39	83	35.0	g., st	*Nymphon grossipes, macrum*
50	May 21	42 08	63 39	1,250	38.0	bu. m	*Colossendeis minuta*
70	June 26	38 25	35 50	1,675		glob. oz	*Pallenopsis oscitans (longirostris?)*

Valorous, 1875 (Norman, 1908)

1	1875	70 30	54 51	175		s. m	*Nymphon hirtipes, serratum; Pseudopallene circularis*
4	1875	67 56	55 27	20		brk. sh	*Nymphon grossipes (glaciale)*

Norwegian North Atlantic, 1876–78 (Sars, 1891; with map)

					° *C.*		
	1876		E.				
18	June 26	62 44	1 48	412	−1.0	c	*Boreonymphon robustum; Nymphon elegans, macronyx; Colossendeis proboscidea*
31	June 29	63 10	5 00	417	−1.0	sa. c	*Nymphon grossipes (mixtum), elegans, megalops; Colossendeis angusta*
			W.				
35	July 5	63 17	1 27	1,081	−1.0	bil. c	*Ascorhynchus abyssi*
48	August 8	64 36	10 22	299	−0.3	dk. gy. c	*Nymphon elegans, megalops, hirtipes; Boreonymphon robustum*
			E.				
53	August 10	65 13	0 33	1,539	−1.3	bil. c	*Ascorhynchus abyssi*

APPENDIX TABLE II—Continued

Norwegian North Atlantic, 1876–78—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1877	° ′ ″	° ′ ″ E.	*Fathoms*	°C.		
124	June 19	66 41	6 59	350	−0.9	crs. c	*Nymphon elegans, macronyx*
137	June 21	67 24	8 58	452	−1.0	c	*Nymphon macronyx; Colossendeis angusta*
164	do	68 21	10 40	457	−0.7	s. c	*Nymphon elegans*
190	July 7	69 41	15 51	870	−1.2	sa. c	*Nymphon macronyx*
192	do	69 46	16 15	649	−0.7	sa. c	*Nymphon macronyx; Boreonymphon robustum*
200	July 17	71 25	15 41	620	−1.0	c	*Nymphon megalops*
205	July 18	70 51	13 03	1,287	−1.2	bil. c	*Ascorhynchus abyssi*
223	August 1	70 45	8 24	70	−0.6	dk. g. sa. c	*Nymphon grossipes (mixtum), hirtipes*
	1878						
262	June 27	70 36	32 35	148	1.9	c	*Nymphon elegans, hirtipes, macronyx*
267	June 29	71 42	37 01	148	−1.4	c., st	*Nymphon hirtipes*
270	June 30	72 47	35 01	136	0.0	c	*Nymphon hirtipes*
273	July 1	73 25	31 30	197	2.2	c	*Nymphon grossipes (mixtum), hirtipes*
275	July 2	74 08	31 12	147	−0.4	c	*Nymphon elegans, hirtipes*
286	July 6	72 57	14 32	447	0.8	c	*Nymphon macronyx*
290	July 7	72 27	20 51	191	3.5	sa. c	*Nymphon grossipes (mixtum), sluiteri, leptocheles, macrum, hirtipes; Eurycyde hispida; Cordylochele malleolata*
303	July 19	75 12	3 02	1,200	−1.6	bil. c	*Ascorhynchus abyssi*
312	July 22	74 54	14 53	658	−1.2	c	*Nymphon elegans; Colossendeis angusta*
315	do	74 53	15 55	180	2.5	c. s	*Nymphon elegans, serratum*
326	Aug. 3	75 31	17 50	123	1.6	c	*Nymphon hirtipes*
336	Aug. 5	76 19	15 42	70	0.4	c. hd	*Nymphon longitarse, hirtipes*
338	Aug 6	76 19	18 01	146	−1.1	hd	*Nymphon serratum, hirtipes*
343	Aug. 7	76 34	12 51	743	−1.2	c	*Nymphon elegans, megalops, macronyx*
353	Aug. 10	77 58	5 10	1,333	−1.4	bil. c	*Ascorhynchus abyssi*
362	Aug. 14	79 59	5 40	459	−1.0	c	*Nymphon strömi (gracilipes), macronyx; Boreonymphon robustum; Cordylochele malleolata*
363	do	80 03	8 28	260	1.1	c	*Boreonymphon robustum; Nymphon strömi (gracilipes), elegans, hirtipes; Cordylochele malleolata*

Speedwell, 1877–79 (Station data: Sanderson Smith, 1889—with charts)

	1877	W.			° F.		
4	Aug. 4	Massachusetts Bay		22	45.?	g	*Nymphon grossipes*
7	do	do				s. & m	*Nymphon grossipes, longitarse*
8	Aug. 6	do		20	55	r	*Nymphon grossipes; Tanystylum orbiculare*
9	do	do		25	52.5	g	*Nymphon grossipes*
10	do	do		20.5	50.5	g	*Nymphon grossipes*
19	Aug. 8	do		45		m	*Nymphon longitarse*
21	Aug. 10	do		26		hd. g. st	*Nymphon strömi*
22	do	do		26		hd. g. st	*Nymphon grossipes*
23	do	do		35		m., c. nod	*Nymphon grossipes, strömi, longitarse*
24	Aug. 13	42 30	70 41	33	49.5	sft. m	*Nymphon longitarse*
28	do	Massachusetts Bay		48		sft. m	*Nymphon longitarse*
29	do	do		48		sft. m	*Pycnogonum littorale*
30	do	do		50		m	*Nymphon grossipes, strömi, longitarse*
31	do	do		48–50		m	*Nymphon longitarse*
32	Aug. 14	42 30	70 20	90	38.5–39	m	*Nymphon strömi, longitarse; Pycnogonum littorale*
33	do	42 30	70 20	90		m	*Nymphon strömi, grossipes*
35	Aug. 19	42 37	69 39	160		m	*Nymphon longitarse*
37	Aug. 20	42 39	66 58	115	38–39	g	*Nymphon grossipes*
38	do	42 42	66 58	112		g	*Nymphon macrum*
41	do	42 49	66 19	82		r. barn	*Pycnogonum littorale*
42	Aug. 21	43 03½	65 01½	88	33.5–41	fn. s	*Pycnogonum littorale*
43	do	43 05½	65 02	90			*Nymphon longitarse*
47	do	43 10	65 12½	59		p. & s	*Nymphon longitarse, strömi*
48	do	43 11	65 14½	59		r	*Nymphon longitarse; Pcynogonum littorale*
49	do	43 13	65 17	56	31.5–40	hd	*Phoxichilidium femoratum*
53	Aug. 25	Halifax, N. S		35	34.0	m	*Nymphon grossipes*
54	do	do		35		m	*Nymphon strömi*
59	Aug. 28	do		25	43.5	g	*Nymphon grossipes*
62	do	do		20	47.–48.5	shingle	*Nymphon grossipes, longitarse*
63	Aug. 29	do		26	34.5–35		*Nymphon grossipes*
64	do	do		40		m	*Nymphon longitarse*
65	do	do		40			*Nymphon longitarse*
68	do	do		16	44⅔–45		*Nymphon grossipes, longitarse*

APPENDIX TABLE II—Continued
Speedwell, 1877–79—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1877	° ′ ″	° ′ ″ W.	*Fathoms*	°*F.*		
78	Sept. 5	Chebucto Head, N. S		25	33.–37½	r. null	*Nymphon grossipes, longitarse*
80	do	44 22	63 28	57	32¾–35¾	m. p	*Nymphon hirtipes*
81	do	Chebucto Head, N. S		57		st. sp. rd. al	*Nymphon hirtipes*
85	Sept. 6	do		101			*Nymphon grossipes, longitarse*
86	do	do					*Nymphon grossipes, longitarse*
95	Sept. 13	Halifax, N. S				fn. s., oz	*Nymphon grossipes*
101	Sept. 15	do		42		fn. s	*Nymphon hirtipes*
102	do	do		42		r. & s	*Nymphon hirtipes*
110	Sept. 21	do		37			*Nymphon hirtipes*
112	Sept. 24	Chebucto Head, N. S		52	35	fn. s. m	*Nymphon hirtipes*
113	do	do		52	35	fn. s. m	*Nymphon hirtipes, longitarse*
115	do	do		52		fn. s. m	*Nymphon strömi*
118	do	do		53		s. m. r	*Nymphon grossipes, hirtipes*
121	Sept. 27	Halifax, N. S		43			*Nymphon grossipes*
124	Oct. 17	42 32	70 22½	51	45	m. g. r	*Nymphon grossipes, longitarse*
127	do	Off Cape Ann		75			*Nymphon strömi, longitarse*
	1878						
133	July 23	42 32	70 38½	33		rky	*Nymphon grossipes*
135	July 29	42 32½	70 38½	25	40.5	s. & g	*Nymphon grossipes*
140	do	42 34	70 32	38	40	m	*Nymphon longitarse*
149	Aug. 3	Massachusetts Bay		19½	42	s. & g	*Nymphon grossipes*
152	do	do				s. & m	*Nymphon strömi*
154	Aug. 15	42 35	70 31	38	41.5	p. crs. s	*Nymphon longitarse*
155	do	42 35	70 30	42		m	*Nymphon longitarse*
156	do	Massachusetts Bay		42	41.5	s. & m	*Nymphon grossipes, longitarse, strömi*
158	do	do		38		m. rks	*Nymphon longitarse*
161	Aug. 16	do		54		fn. s	*Nymphon longitarse, strömi*
163	do	do		73		fn. s	*Nymphon longitarse*
164	do	do		75	40	fn. s	*Nymphon longitarse, strömi*
169	Aug. 19	do		19	40¼	s	*Phoxichilidium femoratum*

170	Aug. 24	42 33	69 59	90	40	s. m. g	*Nymphon strömi, macrum*
171	do	Massachusetts Bay		90	39	s. st	*Nymphon strömi*
172	do	42 33	69 57	115			*Nymphon macrum*
182	Aug. 29	Massachusetts Bay				m	*Nymphon grossipes, longitarse*
184	do	do		110	42½	m	*Nymphon grossipes, longitarse, strömi*
187	Aug. 31	do		110		sft. b. m	*Nymphon grossipes, macrum; Pycnogonum littorale*
188	do	42 33½	69 58½	85	40	s. m. g	*Nymphon macrum; Pycnogonum littorale*
189	do	Massachusetts Bay		85	40	g. p	*Nymphon grossipes*
191	do	do		100		sft. br. m	*Nymphon strömi*
192	do	do		100-110		sft. br. m	*Nymphon strömi*
197	Sept. 2	42 25½	70 23	23	54.5	st. sp	*Nymphon grossipes*
210	Sept. 17	42 38	70 28½	60	43	sft. dk. b. m	*Nymphon longitarse, strömi*
211	do	Off Cape Ann		60		sft. dk. b. m	*Nymphon strömi*
213	do	do		68		m. & conc	*Nymphon strömi*
214	do	do		57		fn. m. s	*Nymphon strömi*
216	Sept. 18	42 30	70 32	35		s	*Nymphon longitarse, strömi*
217	do	42 30	70 35	45		sft. dk. b. m	*Nymphon macrum*
219	do	42 30	70 33	32	55.5	rky. st	*Nymphon grossipes, longitarse*
226	Sept. 23	42 36	70 36	18		rky	*Nymphon grossipes*
227	do	42 33½	70 40	23	58	r. s. g	*Nymphon grossipes*
229	do	Massachusetts Bay		19		rky., crs. s	*Nymphon grossipes; Pycnogonum littorale*
233	Sept. 24	do		45		sft. b. m	*Nymphon strömi*
234	do	do		43		sft. b. m	*Nymphon grossipes, longitarse, strömi*
237	Sept. 26	42 31	70 29	38	49¾	crs. s., g	*Nymphon longitarse*
	1879						
258	July 28	41 55	70 20	20		sft. m	*Nymphon grossipes*
264	July 29	42 10	69 56½	80		bu. m	*Nymphon strömi; Pycnogonum littorale*
277	Aug. 1	42 02	70 15	28	42	s., sh	*Nymphon grossipes*
291	Aug. 11	42 04½	70 16½	30	40	fn. g., s	*Nymphon grossipes; Achelia spinosa*
326	Sept. 1	42 14½	70 02	75	40.5	gn. m	*Nymphon longitarse, strömi; Pycnogonum littorale*
329	Sept. 6	42 00	70 12	26	42.	fn. b. s., p	*Nymphon grossipes*
364	Sept. 18	41 58½	69 44	70		hd. s., br. sh	*Nymphon strömi; Pycnogonum littorale*
365	Sept. 19	41 38	65 53	7½		crs. s	*Nymphon strömi*
370	do	41 35½	69 42	18		crs. s., g	*Nymphon grossipes*
371	do	41 35½	69 35	34½		crs. sp. s	*Nymphon grossipes*
378	Sept. 26	42 04¼	69 39	96		b. m	*Nymphon grossipes*

APPENDIX TABLE II—Continued

William Barents, 1878–79 (Hoek, Niederl. Arch. Zool., Suppl. 1:1–26)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1878	° ′ ″	° ′ ″ E.	*Fathoms*	°*C.*		
3	July 15	74 20	18 30	25			*Nymphon grossipes*
6	July 25	72 05	37 57	160			*Nymphon hirtipes*
8	July 29	74 09	42 02	160			*Boreonymphon robustum; Nymphon hirtipes, strömi; Colossendeis proboscidea*
9	July 30	75 16	45 19	100	−1.3		*Boreonymphon robustum; Nymphon hirtipes, strömi, serratum, sluiteri*
10	July 31	76 31	45 36	130	−1		*Colossendeis proboscidea*
11	Aug. 1	77	45 48	110	−0.6		*Nymphon strömi; Colossendeis proboscidea*
13	Aug. 13	73	43	120			*Nymphon hirtipes*
14	Aug. 23	73 25	±55	2–12			*Nymphon grossipes*
	1879						
6	July 14	72 32.3	36 39.5	128	1.2		*Boreonymphon robustum; Nymphon hirtipes*
6	July 17	74 05	37 31.5	124	−0.2		*Boreonymphon robustum; Colossendeis proboscidea*
7	July 19	75 23.5	38 39.5	88	−1.1		*Nymphon hirtipes*
8	July 21	76 05.3	42 08	150	−1		*Nymphon hirtipes, strömi*
10	July 24	73 42.5	43 38.5	145	0.6		*Boreonymphon robustum; Nymphon hirtipes*
12	July 30	71 06	50 20	62	−0.1		*Nymphon hirtipes*
13	July 31	71 23	49 33	67	1		*Nymphon hirtipes, grossipes, longitarse*
14	Aug. 13	73 10	57	2–11	0		*Nymphon longitarse*

Blake, 1878–79 (Hedgpeth, 1943b)

	1878				W.				°F		
10		24	44	00	83	26	00	37			*Pallenopsis schmitti; Anoplodactylus lentus*
12		24	34	00	86	16	00	36			*Anoplodactylus insignis*
	1879										
162	Jan. 19	16	02	40	61	50	28	734		la. s.	*Colossendeis colossea*
201	Feb. 9	14	34	40	61	08	25	565	40.5	dk. gy. oz.	*Ephyrogymna circularis*
204	Feb. 10	14	24	55	61	00	05	476	42.5	fn. s., br. sh.	*Heterofragilia fimbriata*
222	Feb. 16	13	58	37	61	04	45	422	56.0	s., oz.	*Colossendeis colossea*
227	Feb. 19	13	10	10	61	18	15	572	39.5	s., oz.	*Colossendeis colossea*
260	Feb. 28	12	03	30	61	47	10	291	47.0	s., oz.	*Pallenopsis forficifer*
264	Mar. 1	12	03	15	61	48	30	416	42.5	gy. oz.	*Pallenopsis forficifer*

Blake, 1880 (Wilson, 1881)

	1880										
302	June 28	41	30	00	66	00	00	73	42.5	yl. s., bk. sp.	*Pycnogonum littorale*
303	do	41	34	30	65	54	30	306	40.5	gy. s., bk. sp.	*Pycnogonum littorale*
304	do	41	35	00	65	57	30	139	44		*Pycnogonum littorale*
305	do	41	33	15	65	51	25	810	39.0	dk. gy. m., s. st.	*Colossendeis angusta, colossea; Pycnogonum littorale*
306	June 29	41	32	50	65	55	00	524	39.5	dk. gy. m.	*Nymphon grossipes, strömi; Colossendeis colossea*
307	do	41	29	45	65	47	10	980	38.0	dk. gy. m.	*Colossendeis colossea*
308	do	41	24	45	65	35	30	1242	38.0	dk. gy. m.	*Ascorhynchus armatus; Colossendeis angusta*
310	July 1	39	59	00	70	18	45	260	42.0	gn. m.	*Nymphon strömi*
317	July 12	31	57	00	78	18	35	334	45.0	hd.	*Pallenopsis forficifer*
318	do	31	48	50	77	51	50	337	47.0	co., sh.	*Pallenopsis forficifer*
338	July 18	38	18	40	73	18	10	922	39.0	glob. oz.	*Nymphon tenellum; Colossendeis angusta, macerrima*
339	do	38	16	45	73	10	30	1186	39.0	glob. oz.	*Colossendeis colossea*
342	July 20	39	43	00	70	55	25	1002	39.0	bu. c.	*Colossendeis colossea*

APPENDIX TABLE II—Continued

Knight Errant, 1880 (Hoek, 1881, pp. 94–99)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1880	° ′ ″	° ′ ″ W.	*Fathoms*	°F.		
2	July 28	60 29	8 19	375	31.0	m	*Boreonymphon robustum*
3	August 3	59 12	5 57	53		m	*Pycnogonum littorale*
5	August 11	59 26	7 19	515	44.0	oz	*Nymphon strömi*
7	do	59 37	7 19	530		oz	*Nymphon strömi*
8	August 17	60 03	5 51	540	28.0	oz	*Boreonymphon robustum; Nymphon grossipes, strömi, macronyx; Colossendeis proboscidea*

Travailleur, 1881 (Bouvier, 1916a)

	1881		E.	*Meters*			
	July 6	43 00	03 22	445		m	*Anoplodactylus massiliensis*
			W.	*Fathoms*			
38	August 14	44 11 00	8 13 15	1,048		m	*Colossendeis macerrima (villegenti)*

Triton, 1882 (Hoek, 1883)

	1882			*Fathoms*			
5		60 11 45	8 15 00	433	43.5	hd	*Nymphon hirtipes*
6		60 09 00	7 16 30	466	29.5–30	st	*Boreonymphon robustum; Nymphon grossipes, strömi, macronyx; Colossendeis angusta*
8		60 18 00	6 15 00	640	30.0	m	*Boreonymphon robustum; Nymphon strömi, macronyx; Colossendeis angusta*
9		60 05 00	6 21 00	608	30.0	m	*Boreonymphon robustum; Nymphon grossipes, strömi, macronyx; Colossendeis proboscidea*
10		59 40 00	7 21 00	516	46–46.5	m	*Boreonymphon robustum; Nymphon grossipes, macrum, macronyx; Cordylochele malleolata; Pallenopsis tritonis*
11		59 39 30	7 13 00	555	45.5	oz	*Nymphon longitarse, macrum*

Talisman, 1883 (Bouvier, 1916b, 1937)[a]

	1883			Meters	°C		
16	June 13	34 01	8 32	2,190	4.5	m	*Colossendeis colossea*
33 [32]	June 17	32 34	9 49	1,590		m	*Colossendeis angusta*
34 [33]	do	32 31	9 48	1,350		gsy. m	*Colossendeis michaelsarsi*
41 [38]	June 23	30 09	11 41	2,210	4.0	m	*Colossendeis macerrima*
42 [39]	do	30 08	11 42	2,200		gsy. m	*Colossendeis colossea*
45 [41]	June 24	30 01	11 46	2,115		gy. m., brk. sh	*Colossendeis macerrima*
46 [42]	June 25	29 58	11 41	2,104		gsy. m	*Colossendeis colossea*
52 [48]	June 26	29 01	12 31	1,180	8.5	m	*Colossendeis colossea*
53 [49]	June 27	28 37	13 02	865	7.0	yl. m	*Colossendeis colossea*
76 [73]	July 9	25 39	16 06	1,435		yl. m	*Colossendeis colossea*
81 [79]	July 11	23 57	17 12	1,400	5.2	yl. m	*Colossendeis angusta, macerrima*
83 [80, 81]	do	23 52	17 07	1,250	6.0	gy. m	*Colossendeis angusta, macerrima*
85 [82]	July 12	23 00	17 30	932	7.0	gr. m., s	*Colossendeis angusta, macerrima*
96 [93]	July 14	20 44	18 07	1,495	4.5	gr. m., s	*Colossendeis angusta*
98 [95]	do	20 38	18 19	1,230		gr. m., s	*Colossendeis angusta*
103 [99]	July 17	17 12	17 07	1,617		gr. m	*Colossendeis macerrima*
104 [100]	do	17 16	16 59	1,550		gr. m	*Ascorhynchus armatus*
113 [105]	July 27	Bt. Branco & Razo, Cape Verde Is.		80–110		s., r	*Achelia echinata*
118 [112]	July 30	16 51	25 09	405	11.5	r	*Achelia armata*
120 [118]	do	16 53	25 12	618		m., s	*Endeis charybdaea bispinata*
146 [133]	Aug. 24	42 15	21 17	3,975	3.0	sft. wh. m	*Colossendeis gigas-leptorhynchus*
147 [134]	do	42 19	21 16	4,060	3.0	sft. wh. m	*Colossendeis colossea*
149 [315]	Aug. 25	43 15	19 20	4,165	2.9	sft. wh. m	*Colossendeis gigas-leptorhynchus*

Fish Hawk, 1880–91

	1880			Fathoms	°F		
775	Aug. 6	Narragansett Bay		12	68.0	g., s., m	*Anoplodactylus lentus*
786	Aug. 12	do		19	53.5	m., fn. s	*Anoplodactylus lentus*
824	Aug. 24	Long Island Sound		13	67.0	s	*Callipallene brevirostris*
891	Oct. 2	39 46 00	71 10 00	480?		sft. b. m	*Pallenopsis longirostris*
894	do	39 53 00	70 58 30	365	40.0	b. m., st	*Paranymphon spinosum*

APPENDIX TABLE II—Continued

Fish Hawk, 1880–91—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
		° ′ ″	° ′ ″ W.	*Fathoms*	°*F.*		
	1881						
928	July 20	Vineyard Sound		10	60.0	s	*Callipallene brevirostris; Tanystylum orbiculare*
933	do	do		14	64.0	st	*Tanystylum orbiculare*
934	do	do		9	67.0	s., g	*Tanystylum orbiculare*
945	Aug. 9	39 58 00	71 13 00	207	44.0	gn. m., s	*Nymphon strömi; Pycnogonum crassirostre*
965	Aug. 30	Off Cape Cod		15	53.0	s., g	*Nymphon longitarse*
1028	Nov. 14	39 57	69 17	410	41.0	yl. m	*Achelia brevichelifera*
1041	Nov. 22	Vineyard Sound		9	65.0	s., g	*Tanystylum orbiculare*
	1882						
1093	July 11	39 56	69 45	349	40.0	bu. m., s	*Paranymphon spinosum*
1096	Aug. 11	39 53	69 47	317	40.0	gn. m	*Colossendeis macerrima*
1121	Aug. 26	40 04	68 49	234	41.5	fn. s., st	*Nymphon strömi*
1122	do	40 02	68 50	351	40.5	fn. s., st	*Nymphon strömi*
1123	do	39 59 45	68 54	787	39.0	fn. s., gn. m	*Colossendeis colossea*
1125	do	40 03	68 56	291	40.0	s., m	*Nymphon strömi*
1154	Oct. 4	39 55 31	70 39	193		s., m	*Nymphon strömi; Pycnogonum crassirostre*
	1887						
1205	Aug. 11	Vineyard Sound		10	72.0	sh., r	*Anoplodactylus lentus*
1208	do	do		10	72.0	s. g., sh	*Anoplodactylus lentus*
1222	Aug. 27	do		12.5	69.0	s., sh	*Anoplodactylus lentus*
		SOUTH CAROLINA					
	1891						
1649	Jan. 16	Calibogue Sound		7			*Anoplodactylus lentus*
1651	do	do		10			*Anoplodactylus lentus*

Rodger, on Whaler *Esquimaux*, 1892 (Rodger, 1893)

	1892					
(1)	Apr. 4	Gulf St. Lawrence, 20 mi. N. by W., St. Paul's Id.	100		r	*Pycnogonum littorale*
(2)	Apr. 17	Str. of Belle Isle, off Norman's Lt.	60		r	*Nymphon grossipes (mixtum), brevitarse; Pseudopallene circularis*
		BAFFIN LAND				
	May 30	20 mi. SE. Reef Coal Hill	30		r	*Boreonymphon robustum*
	June 25	Off Cape McCulloch	80			*Boreonymphon robustum; Nymphon hirtipes; Eurycyde hispida*
		"a few mi. S"	90			*Boreonymphon robustum*
	July 4	10 mi S. W. Cape Wild	200			*Nymphon macronyx*
	July 30	Coutt's Inlet	130		m	*Nymphon elegans, sluiteri*
	Aug. 4	20 mi ESE Erick Pt	60–100		m., g	*Nymphon microrhynchum? [longitarse?]*
	August	Cumberland Bay	20			*Boreonymphon robustum*
	Sept. 9	Exeter Harbor	10		st	*[10 species, 3 "new"]*
	Sept. 17	Eglington Harbor	15		m	*Nymphon microrhynchum [longitarse?]*
	Oct. 24	10 mi. NW. by N., Erick Pt.	150		r	*Boreonymphon robustum; Nymphon hirtipes, macronyx; Eurycyde hispida*

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	1893					
56	June 27	24 16 | 81 22	200			*Pallenopsis forficifer*
62	June 29	Amer. Shoal Lt., 8 mi. NE. by N.	70–80			*Pallenopsis forficifer; Ascorhynchus colei*
64	do	Amer. Shoal Lt., 8 mi. N. by W.	110			*Pentacolossendeis reticulata*
		Bahamas Bank				*Pallenopsis schmitti*
		bet. Bahamas and Cuba				*Nymphon macrum*
	May–June	off Havana	100–200			*?Anoplodactylus maritimus*

APPENDIX TABLE II—Continued

Caudan, 1895 (Caullery, 1896)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1895	° ′ ″	° ′ ″ W.	*Fathoms*	°*F.*		
2	Aug. 20	46 34	6 52	570–700		fn. s	*Colossendeis macerrima*
3	----do	46 28	7 00	1,710		co. m	*Paranymphon spinosum*
11	Aug. 24	44 36	4 25	650		m	*Paranymphon spinosum*
13	Aug. 25	44 17	4 38	950		m	*Paranymphon spinosum*
19	Aug. 28	45 18	6 23	400		m	*Pycnogonum littorale*
23	Aug. 30	46 40	6 52	400			*Pycnogonum littorale*

Ingolf, 1895–1896 (Meinert, 1899—with map; as corrected and amended by Stephensen, 1933)

	1895–96				° *C.*		
2		63 04	9 22	262	5.3	gy c	*Nymphon grossipes, megalops (sarsii), strömi, macronyx, Colossendeis angusta*
3		63 35	10 24	272	0.5	gy c	*Nymphon strömi; Boreonymphon robustum; Colossendeis angusta*
4		64 07	11 12	237	2.5	gy c	*Boreonymphon robustum; Nymphon strömi, macronyx, hirtum*
7		63 13	15 41	600	4.5	b. c	*Nymphon macrum, spinosissimum*
9		64 18	27 10	295	5.8	b. c	*Nymphon hirtum?; Cordylochele malleolata*
11		64 34	31 12	1,300	1.6	glob. c	*Colossendeis colossea, macerrima*
15		66 18	25 59	330	−0.75		*Nymphon elegans, hirtum?; Boreonymphon robustum*
18		61 44	30 29	1,135	3.0	glob. c	*Colossendeis colossea*
24		63 06	56 00	1,199	2.4	gy. c	*Callipallene acus*
25		63 30	54 25	582	3.3	gy. c	*Nymphon macrum; Paranymphon spinosum*
27		64 54	55 10	393	3.8	gy. c	*Nymphon groenlandicum, hirtipes, macrum; Cordylochele longicollis*
28		65 14	55 42	420	3.5	gy. c	*Nymphon macrum*
28		65 34	54 31	68	0.2	s	*Nymphon strömi, longitarse*
31		66 35	55 54	88	1.6	s	*Nymphon grossipes*

32	66	35	56	38	318	3.9	gy. c	*Nymphon strömi, leptocheles, spinosissimum, macrum; Cordylochele malleolata, longicollis*
33	67	57	55	30	35	0.8	s	*Nymphon spinosissimum*
35	65	16	55	05	362	3.6	c	*Nymphon strömi, leptocheles, spinosissimum*
36	61	50	56	21	1,435	1.5	c	*Callipallene acus*
38	59	12	51	05	1,870	1.3	glob. c	*Nymphon megalops*
41	61	39	17	10	1,245	2.0	glob. c	*Boreonymphon robustum*
44	61	42	9	36	545	4.8		*Nymphon strömi*
47	61	32	13	40	950	3.23	glob. c	*Pallenopsis longirostris (plumipes).*
51	64	15	14	22	68	7.32		*Nymphon hirtum?*
53	63	15	15	07	795	3.08		*Nymphon hirtum?*
54	63	08	15	40	691	3.9		*Nymphon hirtum?*
55	63	33	15	02	316	5.9		*Nymphon macrum*
64	62	06	19	00	1,041	3.1	b. c	*Colossendeis angusta, clavata*
70	63	09	22	05	134	7.0		*Colossendeis angusta*
73	62	58	23	28	486	5.5	c	*Cordylochele longicollis*
78	60	37	27	52	799	4.5	glob. c	*Nymphon hirtum?*
81	61	44	27	00	485	6.1	glob. c	*Nymphon macrum*
87	65	02	23	56	110			*Nymphon grossipes, strömi, hirtum?*
88	64	58	24	25	76	6.9		*Colossendeis macerrima; Pycnogonum crassirostre*
93	64	24	35	14	767	1.46		*Nymphon serratum, megalops, hirtum?*
94	64	56	36	19	204	4.1	br. sh., s	*Nymphon serratum; Paranymphon spinosum*
95	65	14	30	39	752	2.1		*Nymphon grossipes, hoeki, brevitarse*
96	65	24	29	00	735	1.2		*Nymphon brevitarse*
98	65	38	26	27	138	5.9	s., for	*Nymphon hirtum?*
101	66	23	12	05	537	−0.7	gy. c	*Boreonymphon robustum; Nymphon macronyx*
103	66	23	8	52	579	−0.6	c	*Boreonymphon robustum; Nymphon macronyx; Colossendeis angusta*
104	66	23	7	25	957	−1.1	glob. c	*Colossendeis angusta*
105	65	34	7	31	762	−0.8	glob. c	*Nymphon macronyx, sluiteri; Boreonymphon robustum; Colossendeis angusta*
106	65	34	8	54	447	−0.6	c	*Nymphon strömi; Colossendeis angusta*
110	66	44	11	33	781	−0.8	c	*Colossendeis angusta*
112	67	57	6	44	1,267	−1.1	glob. c	*Ascorhynchus abyssi (tridens)*
113	69	31	7	06	1,309	−1.0	glob. c	*Ascorhynchus abyssi (tridens); Colossendeis angusta*
114	70	36	7	29	773	−1.0		*Ascorhynchus abyssi (tridens)*
115	70	50	8	29	86	0.1	bl. c	*Boreonymphon robustum*
116	70	05	8	26	371	−0.4	c	*Boreonymphon robustum; Nymphon sluiteri, elegans, macronyx; Colossendeis proboscidea*

APPENDIX TABLE II—Continued

Ingolf, 1895–1896—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1895–96	° ′ ″	° ′ ″ W.	*Fathoms*	°*C.*		
117		69 13	8 23	1,003	−1.0	glob. c	*Colossendeis angusta*
120		67 29	11 32	885	−1.0	c	*Colossendeis angusta*
121		66 59	13 11	529	−0.7		*Nymphon grossipes*
124		67 40	15 40	495	−0.6	gy. c	*Colossendeis proboscidea*
125		68 08	16 02	729	−0.8	c	*Colossendeis angusta*
126		67 19	15 52	293	−0.5		*Nymphon elegans; Boreonymphon robustum; Cordylochele malleolata*
127		66 33	20 05	44	5.6	g	*Nymphon hirtum?, serratum; Pseudopallene circularis*
138		63 26	7 56	471	−0.6	g., c	*Nymphon strömi, sluiteri, elegans, macronyx; Boreonymphon robustum; Colossendeis angusta*
139		63 36	7 30	702	−0.6	c	*Boreonymphon robustum; Colossendeis proboscidea*
140		63 29	6 57	780	−0.9	c	*Boreonymphon robustum; Nymphon macronyx; Colossendeis angusta*
141		63 22	6 58	679	−0.6	gy. c	*Boreonymphon robustum; Nymphon macronyx; Colossendeis angusta*
143		62 58	7 09	388	−0.4	gy. c	*Boreonymphon robustum; Nymphon megalops*
144		62 49	7 12	276	1.6		*Nymphon hirtum?*

Hirondelle, 1886–88; *Princesse Alice*, 1891–1915 (Bouvier, 1917)

	1887			*Meters*			
161	Aug. 2	46 04 40	46 42 15	1,267		sft. gy. m	*Nymphon macrum; Colossendeis angusta*
	1888						
184	July 14	40 05	27 27 45	1,850		glob. m	*Colossendeis colossea*
247	Aug. 30	38 24	28 01 25	318		r	*Endeis spinosa*
	1891						
269	Sept. 11	50 05	30 22 45	63			*Nymphon grossipes*

	1892						
273	Aug. 13	50 22	0 00	70			*Pycnogonum littorale*
	1894						
467	July 28	36 31	11 33 45	60			*Achelia echinata*
486	Aug. 21	43 52	9 05 45	1,674		fn. s., for	*Colossendeis macerrima*
503	Aug. 29	47 10	50 47 45	1,262		m., s	*Pycnogonum littorale*
	1895						
515	June 17	38 12	9 37 45	2,028		gy. m	*Colossendeis colossea*
575	July 13	38 27	26 30 15	1,165		m., s	*Colossendeis colossea*
584	July 16	38 31	26 49 15	845		r	*Callipallene producta*
	1896						
683	July 7	38 20	28 04 45	1,550		m., s	*Colossendeis colossea*
	1897						
882	Aug. 7	38 03 40	28 34 45	98		g. s. brk. sh	*Achelia echinata*
	1898						
922	July 6	58 16	5 48 15	343		gn. m	*Nymphon spinosissimum; Cordylochele longicollis*
952	July 22	69 17 30	14 24 15	1,185		m	*Boreonymphon robustum; Colossendeis proboscidea*
960	July 29	72 37	20 00 15	394		g., m	*Boreonymphon robustum; Nymphon hirtipes*
966	July 30	Beeren Id		20			*Nymphon grossipes*
970	July 31	76 30	25 27 15	48		g., sh	*Nymphon grossipes, serratum*
997	Aug. 11	78 22	17 10 15	102		bk. m	*Nymphon hirtipes; Cordylochele brevicollis*
1012	Aug. 18	80 01	10 15 15	430		m., s	*Nymphon strömi, sluiteri, hirtipes, spinosissimum*
1020	Aug. 20/30	78 08 30	13 44 15	393		bk. m	*Nymphon strömi, hirtipes*
1040	Sept. 7	65 21	10 42 15	650		m	*Boreonymphon robustum; Cordylochele brevicollis*
1043	Sept. 13	59 03	1 47 45	88			*Nymphon grossipes*
	1901						
1203	Aug. 18	15 54	22 54 45	91			*Eurycyde raphiaster; Achelia setulosa*
1248	Sept. 13	36 08	8 02 45	1500		gy. m	*Ascorhynchus abyssi*
	1902						
1318	Aug. 5	38 06	26 13 45	3018		m., vol. s	*Colossendeis colossea*
1334	Aug. 13	39 30	29 02 15	1900			*Callipallene acus; Colossendeis colossea*
	1903						
1583	Sept. 15	47 36	7 38	1490		glob. m., vol. s	*Colossendeis colossea*

APPENDIX TABLE II—Continued

Hirondelle, 1886–88; *Princesse Alice*, 1891–1915—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1906	° ′ ″	° ′ ″ W.	*Meters*	°*C.*		
2442	July 28	Wijde Bay, Spitsbergen		20			*Nymphon grossipes*
2455	Aug. 2	Pr. Charles Foreland		18			*Nymphon grossipes*
2534	Sept. 5	Karlsö, Norway					*Pseudopallene circularis; Eurycyde hispida*
	1907						
2634	Aug. 7	Havre Grau, Spitsbergen		10–15		m., p	*Nymphon grossipes*
	1908						
2717	July 19	36 42	8 40	750		m., s	*Paranymphon spinosum*
	1910						
2990	Aug. 18	43 45 30	9 41	2320		glob. m	*Colossendeis colossea, macerrima, clavata*
	1911						
3113	Aug. 9	32 34 45	17 05 30	1700		m., s	*Colossendeis colossea*
	1915						
3437	Aug. 26	42 40	62 49 30	1458			*Colossendeis colossea*

Valdivia, 1898 (Möbius, 1902; G. Schott, Valdivia Exp.1:80–81)

	1898		W.				
3				79			*Pycnogonum littorale*
6	Aug. 7	60 40	5 36	650	−0.1	glob. oz	*Colossendeis angusta*
7	do	60 37	5 42	588	0.8	c. s	*Boreonymphon robustum; Nymphon hirtipes, macrum; Cordylochele malleolata*
10	do	59 37	8 50	1,326	5.4	glob. & terr. sed	*Nymphon macronyx; Cordylochele longicollis; Colossendeis angusta*

Bruce, on *Blencathra*, 1898 (Carpenter, Sci. Proc. Roy. Soc. Dublin 9:279–282)

	1898		E.	Fathoms			
	June 6	68 52	49 23	20			*Pseudopallene circularis*
	do	70 02	49 10	34			*Nymphon grossipes*
	June 16	70 48	53 09	20			*Nymphon grossipes; Pseudopallene circularis*
	July 8	76 54	36 48	76			*Cordylochele malleolata*
	July 13	76 28	33 06	100			*Boreonymphon robustum; Nymphon macronyx; Colossendeis proboscidea*
	July 15	78 21	27 55	100			*Boreonymphon robustum; Nymphon strömi*

Princeton Arctic Exp., 1899, whaler *Diana* (Ortmann, 1901)

	1899	[NW. Greenland]				
26	Aug. 9	S. of Cape Alexander	27		r	*Nymphon grossipes*
27	Aug. 10	Off Cape Chalon	35		r. & bryoz	*Nymphon grossipes*
39	Aug. 18	Granville Bay	30–40		sh. & m	*Nymphon hirtipes, longitarse; Pseudopallene circularis*
40	do	Granville Bay	20–30		sh., bryoz. m	*Nymphon grossipes, longitarse, serratum; Pseudopallene circularis*
43	Aug. 20	Barden Bay	20–25		glac. m	*Nymphon grossipes*
49	Aug. 24	Olricks Bay, upp. narrows	15–20		st. & kelp	*Nymphon grossipes*
52	Aug. 25	Robertson Bay	5–15		kelp	*Nymphon longitarse*

Swedish Zoological Expedition, 1899–1900 (Lönnberg, 1902, pp. 353–359)

	1899		W.	Meters			
18		74 65	17 59	350			*Colossendeis angusta*
24		73 24	21 25	70			*Nymphon hirtipes*
25		72 28	21 48	180			*Boreonymphon robustum*
41		72 43	24 49	35–60			*Nymphon hirtipes*
42		72 56	24 49	125			*Boreonymphon robustum*
43		73 32	24 35	100–110			*Boreonymphon robustum*

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APPENDIX TABLE II—Continued

Swedish Zoological Expedition, 1899–1900—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1900	° ′ ″	° ′ ″ W.	*Meters*	°*C.*		
6		Spitsbergen		350		m	*Nymphon hirtipes*
			E.				
7		78 20	11 30	5–10		st., alg	*Nymphon grossipes*
8		Spitsbergen		10–30		st. & s., lam	*Nymphon longitarse*
			W.				
13		72 01	8 33	2,400		m	*Ascorhynchus abyssi*
16		72 25	17 56	300		st. s	*Boreonymphon rubustum; Nymphon elegans, hirtipes*
17		Mackenzie Bay, E. Greenland.		12–35		m	*Boreonymphon robustum; Nymphon hirtipes, strömi, sluiteri; Cordylochele brevicollis*
18		74 30	18 40	80–100		m. & st	*Nymphon hirtipes, grossipes (mixtum), sluiteri; Cordylochele brevicollis*
19		74 35	18 15	150		m	*Boreonymphon robustum; Nymphon hirtipes, strömi*
20		73 55	19 20	150		m	*Boreonymphon robustum; Nymphon grossipes (mixtum), hirtipes, strömi*
21		Mackenzie Bay		250		m	*Boreonymphon robustum; Nymphon hirtipes, elegans, macronyx*
22		do		12–18		m	*Nymphon strömi, macronyx; Colossendeis angusta*
23		do		3–10		m	*Nymphon hirtipes, longimanum*
24		do		1–3		s	*Nymphon sluiteri, macronyx, longimanum*
25		Fr. Josef Fjord		300		m	*Boreonymphon robustum*
26		Fr. Josef Fjord		100		m	*Boreonymphon robustum; Nymphon strömi, macronyx*
27		Fr. Josef Fjord		220			*Boreonymphon robustum; Nymphon strömi, macronyx; Cordylochele breuicollis; Colossendeis proboscidea*
28		Mackenzie Bay		100		m	*Boreonymphon robustum; Nymphon strömi, hirtipes; Colossendeis angusta*
29		72 42	14 49	2,000		m., for	*Ascorhynchus abyssi*

Michael Sars, 1900–14, Stephensen (various papers, amended and corrected by correspondence).[b]

	1900						
58	Aug. 30	72 40	23 10	300	3.2°/300 m.		*Colossendeis proboscidea*
62	Sept. 5	74 19	16 30	280	2.0°/250 m.		*Nymphon strömi?, macrum*
		74 15	16 50				
	1901						
II	May 9	71 22	27 55	393			*Nymphon leptocheles*
	1902		E				
35	June 27	62 58	1 56	1,100		c	*Boreonymphon robustum; Colossendeis proboscidea*
37	June 29	62 42	1 26	775		c	*Nymphon elegans*
38	do	62 33	1 56	550	4.91/400 m.	br. s	*Nymphon hirtipes*
55	July 19	62 40	1 56	670	−0.21	c	*Boreonymphon robustum; Nymphon elegans; Colossendeis angusta, proboscidea*
56	July 20	62 33	2 03 W	500	?.90	fne. s	*Nymphon strömi*
67	July 28	62 35	4 04	600	−0.13/620	c	*Nymphon elegans*
75	Aug. 10/11	60 10	6 35	1,220	−0.41/1100	fne. br. bk s	*Nymphon elegans*
76	Aug. 11/12	59 28	8 01	1,100–1,300	8.07°/1000	c	*Nymphon spinosissimum, macronyx; Colossendeis proboscidea*
91	Aug. 23	64 27	13 27	ca. 160	4.5 (?)	dk. s., st	*Nymphon spinosissimum, hirtipes, grossipes, strömi, macrum, serratum*
	1903						
139	June 26	61 33	0 09 E	164			*Pycnogonum littorale*
141	July 1	58 0	3 24	93			*Nymphon strömi; Pycnogonum littorale*
	1904						
212	June 19	57 44	5 35	100			*Nymphon strömi*
263	July 1	55 44	1 49 W	77		dk. s	*Pycnogonum littorale*
275	July 6	57 09	1 30 E	96	6.15		*Nymphon strömi*
351	Aug. 27	59 34	1 30	110		fne. s	*Pycnogonum littorale*
	1905						
62		70 03	36 0	160	1.92–2.0		*Colossendeis proboscidea*
72	July 24	74 12	17 18	200–215	1.82–2.0/200 m.		*Colossendeis proboscidea*

APPENDIX TABLE II—Continued

Michael Sars, 1900–14, Stephensen—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
		° ′ ″	° ′ ″	*Meters*	°*C.*		
	1909		E.				
108		70 32	18 17	300		s	*Nymphon leptocheles*
	1910		W.				
13	May 22	41 32	9 05	78			*Nymphon macrum*
70	June 30	42 59	51 15	1,100	3.7		*Nymphon macrum*
102	July 10	60 57	4 38	1,098			*Boreonymphon robustum*
	1911						
18c	May 24	62 09	00 02	500/700			*Boreonymphon robustum*
		62 14	00 21				
	1914		E.				
4	June 3	70 11	30 41	115–124	4.2 / 115 m.		*Boreonymphon robustum*
		71 12	30 46				
6	June 4	70 09	30 52	199–209		s. & c	*Nymphon hirtipes*
		70 10	30 55				
7	June 5	70 18	32 23	206	2.2 / 195 m.	s., sh. st	*Nymphon serratum*
28	June 24/25	70 16	32 20	158–275	1.9 / 160 m.	s., co., c	*Nymphon hirtipes*
		70 17	32 27				
56	July 13	75 07	32 22	179		sh., s., g	*Boreonymphon robustum; Colossendeis proboscidea*
62	July 16	74 15	20 36	166–200	0.64 / 140 m.	c., sh	*Nymphon hirtipes*
63	do	74 09	19 18	106		s. sh	*Nymphon hirtipes*
65	July 18	74 15	17 42	170/183	4.99 / 150 m.	s. g	*Nymphon serratum, leptocheles, Boreonymphon robustum*
		74 21	17 15				
74	July 31	70 40	20 50	168/220	6.17 / 180 m.	s. & c	*Cordylochele malleolata*
		70 43	20 27				

Miscellaneous (Stephensen, 1935) [c]

	***Heimdal*, 1900**						
14		70	4 31 10	94	2.65		*Nymphon hirtipes*
	***Tovik*, 1924**						
91	Aug. 22	78 2 30	14 12	153			*Nymphon leptocheles*
	***Tovik*, 1925**						
26	July 13	76 50	13 22	148–175	3.8 / 100 m.		*Nymphon hirtipes*
	***Tovik and Kirkholmen*, 1928**						
49	Sept. 2	Green Harbor, Svalbard					*Nymphon leptocheles*

Iceland (Stephensen, "Zoology of Iceland," 1937) [c]

			W			
	64 51	13 45	150			*Nymphon hirtipes*
	65 42	13 57	113			*Nymphon serratum*
	65 14	14 08	51			*Nymphon spinosissimum*
	64 25	14 18				*Pseudopallene spinipes*
	64	14 22	128	7.32		*Nymphon spinosissimum*
	64 04	15 42	65			*Nymphon grossipes*
	66 17	18 13	98			*Nymphon hirtipes; Pycnogonum littorale*
	63 27	18 27	150			*Nymphon spinosissimum*
	63 20	20 00	65–75			*Nymphon hirtum*
	63 15	20 04	216			*Nymphon spinosissimum*
	66 33	20 05	83	5.6		*Nymphon hirtipes, grossipes; Pseudopallene circularis*
	63 30	20 14	80			*Nymphon hirtum, grossipes, longitarse, strömi*
	63 18	21 30	178			*Nymphon spinosissimum, grossipes, leptocheles*
	63 15	22 23	216–326			*Nymphon spinosissimum, grossipes, leptocheles, strömi*
	64 04	22 26 30	40			*Nymphon hirtum*
	66 13	23 42	50			*Nymphon hirtum*
	65 02.3	23 56.5	207			*Nymphon spinosissimum, grossipes, strömi*
	65 52	23 58	62			*Nymphon hirtum; Pseudopallene spinipes*
	60	24 09	60	7.2	g. sh	*Pycnogonum crassirostre*
	66	24 14	60			*Nymphon hirtum*
	66 08	24 21	90			*Nymphon hirtipes*
	64 48	24 25	143	6.9		*Pycnogonum crassirostre*
	66 53	24 42	215			*Nymphon hirtipes, grossipes, strömi*
	66 13	25 10				*Nymphon leptocheles*
	66 20	25 12	175			*Nymphon hirtipes, macrum*

APPENDIX TABLE II—Continued

Ireland Fisheries, 1901–03 (Carpenter, 1905)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1901			*Fathoms*			
(1)	Aug. 24	77 mi WNW. Achill Head		382	(Deep pelagic tow)		*Nymphon leptocheles; Pallenopsis tritonis (holti); Anoplodactylus typhlops*
(2)	Sept. 12	50 mi WNW. Cleggan Head		120			*Pycnogonum littorale*
(3)	Sept. 13	50 mi NW. by N. Cleggan Head		100			*Pycnogonum littorale*
	1903						
(4)	July 13	50 mi WNW. Cleggan Head		120			*Pycnogonum littorale*
(5)	Aug. 7	50 mi WNW. Tearaght		306	(Deep pelagic tow)		*Anoplodactylus oculatus*
(6)	Aug. 17	50 mi WNW. Cleggan Head		120	do		*Pycnogonum littorale*

***Belgica*, 1905 (Duc d'Orléans, Croisière Oceanographique . . . . Mer du Grönland, 1905, Brussells: Charles Bulens, 1907)**

		° ′ ″	° ′ ″	*Meters*	° *C.*		
	1905		E.				
4	June 12	79 51	11 37	80		s	*Nymphon grossipes, hirtipes; Pseudopallene circularis; Eurycyde hispida*
11A	July 7	79 52	10 42	310	2.42/300 m.	st	*Nymphon hirtipes, serratum*
			W.				
32	July 24	75 58	14 08	300	0.38	c	*Boreonymphon robustum; Nymphon macronyx*
		75 59	14 12				
41	July 31	78 09	14 01	78	−1.77	st., sh., c. s	*Nymphon grossipes, hirtipes*
45	Aug. 3	77 31	18 24				*Nymphon strömi, elegans*

Tjalfe, 1908–09 (Stephensen, 1933)

	1908		W.	*Meters*			
40c	June 10	63 48	52 23	194			*Nymphon hirtipes, grossipes, strömi*
107	July 9	68 20	54 03	420–525			*Nymphon sluiteri, strömi*
155	July 27	69 46	51 22	475			*Nymphon strömi, serratum*
	1909						
337	May 8	64 05	55 20	1,100			*Nymphon hirtipes*
367	May 19	66 22	57 16	686		s. & st	*Nymphon macrum, spinosissimum*
369	May 20	66 45	56 40	abt. 400			*Nymphon spinosissimum*
397	May 31	66 42	56 12	250			*Nymphon grossipes*
402	June 2	64 40	56 37	720–775			*Nymphon hirtipes*
429	June 8	63 54	53 15	988–1400			*Nymphon spinosissimum, macrum; Cordylochele longicollis*
431	June 9	63 24	53 10	892			*Nymphon spinosissimum, macrum*

Michael Sars, 1910 (Olsen, 1913)

	1910		W.	*Meters*			
24	May 6/7	35 34	7 35	1,615			*Colossendeis colossea, macerrima*
25B	May 7/8	35 46	8 16	2,055		glob. oz	*Colossendeis colossea, macerrima*
38	May 20	26 03	14 36	83			*Nymphon longituberculatus*
41	May 23	28 08	13 35	1,365		glob. oz	*Colossendeis michaelsarsi*
70	June 30	42 29	51 15	1,215		r	*Colossendeis angusta*
70	do	42 29	51 15	1,100	(Deep pelagic tow)		*Nymphon macrum; Colossendeis macerrima*
102	Aug. 10	60 57	4 38	1,098		bu. m	*Boreonymphon robustum; Colossendeis angusta*
102	do	60 57	4 38	1,000	(Deep pelagic tow)		*Nymphon grossipes*

Grampus, 1912 [d]

	1912		W.	*Fathoms*	*° C.*		
10013	July 24	43 16	70 20				*Nymphon grossipes*
10019	July 29	43 30	69 48	45 (91)	5.67		*Nymphon grossipes, strömi*
10021	Aug. 2	43 38	69 13	60 (110)	7.22		*Nymphon longitarse*
10037	Aug. 21	44 17	68 05	22 (37)	9.89		*Nymphon grossipes, Pseudopallene circularis; Phoxichilidium femoratum*

APPENDIX TABLE II—Continued

Sylvana, 1913 (Bouvier, 1914a)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
		° ′ ″	° ′ ″ W.	*Meters*	° *C.*		
	1913	[Port. Guinea]					
(1)	Apr. 5	Near Rouban & Bubak Id.		25–30			*Anoplodactylus polignaci*

Pourquoi Pas? 1913 (Bouvier, 1914c) [a]

	1913						
22		70 47	08 22	140			*Boreonymphon robustum; Nymphon hirtipes, longimanum* var. *le danoisi*
25		71 04	07 56	70			*Nymphon hirtipes; Colossendeis proboscidea*
27		70 58	08 07	160			*Boreonymphon robustum; Nymphon hirtipes, strömi*
28		70 58	08 42	40			*Nymphon hirtipes, grossipes*
29		70 56	08 55	40			*Nymphon hirtipes*
30		70 58	08 54	300			*Boreonymphon robustum*
31		66 13	23 42	50			*Nymphon hirtum*
32		66 00	24 14	60			*Nymphon hirtum*

[Remy, 1928. Ann. Sci. Nat. Paris (10), 11; 209-248 (230)]

	1926						
2043	Aug. 11	70 20	21 40	70		bu. m., r.	*Nymphon hirtipes*

Prince, 1917 (Giltay, 1942; station data from A. G. Huntsman, pers. comm.)

	1917						
43	July 16/17	47 06 20	61 26 45	40–45	0.79	s	*Nymphon grossipes (glaciale), longitarse; Achelia scabra*
48	July 30	47 03 45	59 51 58	378	3.90	sft. m	*Pallenopsis longirostris*
30	Aug. 7	46 42 53	61 03 40	87–93			*Nymphon longitarse*
53A	Sept. 1	46 40 48	61 01 47	40			*Nymphon longitarse*
54	Sept. 10	46 41 28	61 02 30	60			*Nymphon longitarse*

Fish Hawk, 1901–20

	1901			*Fathoms*			
7148	Nov. 6	29 48 10	83 55 15	5			*Anoplodactylus insignis*
7201	Dec. 6	29 32 30	85 50 00	9			*Anoplodactylus insignis*
	1902						
7279	Nov. 14	24 21 55	81 58 25	98			*Pentacolossendeis reticulata*
7283	Nov. 19	24 17 30	81 53 30	127			*Nymphon macrum*
7285	do	24 15 00	81 47 30	306			*Pallenopsis forficifer*
7288	Nov. 24	24 42 50	81 53 38	7			*Anoplodactylus insignis*
7293	do	24 42 30	81 55 52	7¼			*Anoplodactylus insignis*
7351	Dec. 17	25 09 45	81 18 35	3¼			*Anoplodactylus insignis*
	1915						
8341	Nov. 22	37 22 12	76 10 25	9.5			*Tanystylum orbiculare*
	1916						
8506	Apr. 22	37 16 50	76 14 27	5.5			*Tanystylum orbiculare*
	1920	[Chesapeake Bay]					
8821	July 8	Off Sandy Point		7.77			*Callipallene brevirostris*
8826	do	Off Plantation Point		45.75			*Anoplodactylus parvus*
8841	Aug. 22	do		12.8			*Endeis spinosa*
8887	Oct. 19	Off Rappahannock Spit		12.81			*Anoplodactylus parvus*
8898	Dec. 4	Off Thimble Rock		28.08			*Callipallene brevirostris*

APPENDIX TABLE II—Continued

Vanneau, 1923–26 (Loman, 1925, 1928b, 1929)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
		° ′ ″	° ′ ″ W.	*Meters*	° *C.*		
	1923						
XXII	July 23	34 05	7 05	130–150		bk. m	*Anoplodactylus massiliensis*
XXI	July 27			140–150			*Achelia echinata*
	1924						
XXXI	May 30	33 54 30	7 34	125		bk. m	*Anoplodactylus massiliensis; Achelia echinata; Endeis spinosa*
XXXIII	June 2	33 41 15	7 35 51	50		fn. s	*Ascorhynchus arenicola*
XLV	June 14	33 37 05	7 56 06	55		s., r	*Endeis spinosa*
LVII	June 24	33 24	8 24 06			s., cal. alg	*Endeis spinosa*
	1925						
LXVIII	July 22	30 34 40 30 34 55	9 48 30 9 48 25	43		m	*Nymphon gruveli*
LXXII	August 25	30 30 25	9 43 30	40			*Nymphon gruveli*
LXXIII	August 26						*Nymphon gruveli*
LXXX	August 31	30 21	9 56 30	150		m., s., r	*Pycnogonum nodulosum*
LXXXII	do	30 21 40	9 41 40	30			*Nymphon gruveli*
LXXXIII	September 2	30 27	9 56 10	150		s. m	*Nymphon gruveli*
LXXXVIII	September 3	30 38 10	9 58 40	80			*Achelia echinata*
XCI	September 5	30 32 50	10 08 50	150		m. s	*Endeis spinosa*
XCVII	September 8	30 30 30	9 47	52		r	*Nymphon cognatum*
	1926						
CXVIII	August 25	30 36	9 52 40	20		s	*Nymphon gruveli; Ascorhynchus arenicola*
CXIX	do	30 36	9 55 10	47		s	*Nymphon gruveli*
CXXI	do	30 37 20	9 54 30	18		r., rd. alg	*Nymphon cognatum*
CXXVIII	August 28	30 27 50	9 50 47	115		s., r	*Endeis spinosa*
	August 29	30 31 30 30 36	9 55 9 51	20–93		m., s	*Nymphon gruveli*

Dana, 1925 (Stephensen, 1933)

	1925						
2338	June 20	64 45	54 06	490			*Nymphon spinosissimum*
2346	June 22	66 37	56 37	460	3.12		*Nymphon spinosissimum; Cordylochele longicollis; Colossendeis angusta*
2361	June 26	68 08	57 30	398	2.47		*Nymphon grossipes, strömi; Cordylochele brevicollis; Colossendeis proboscidea*
2363	June 27	69 30	56 32	202			*Nymphon hirtipes, strömi, serratum*

Johann Hjort, 1927 (Stephensen, 1935)

	1927		E.				
340	June 23	70	33 17	120–125			*Nymphon serratum, leptocheles*

Godthaab, 1928 (Stephensen, 1933)

	1928	W.					
10	June 3	56 56	51 17	3,500	(Deep pelagic tow)		*Pallenopsis calcanea*
14	June 6	55 00	56 34	314	2.8		*Nymphon hirtipes, elegans*
24	June 14	62 19	56 00	2,550	1.9	(pelagic)	*Pallenopsis calcanea*
29B	June 16	62 42		25			*Pseudopallene circularis*
39	July 3	66 51	57 40	680	0.45		*Nymphon spinosissimum, macrum*
51	July 14	69 45 02	58 25	320	1.7		*Nymphon macronyx*
64	July 28	73 12	58 08	850	0.5		*Cordylochele brevicollis; Colossendeis angusta*
65	do	73 30 08	59 36	225	−0.1		*Nymphon grossipes, strömi*
73	July 30	74 52 05	62 12	450	0.7		*Cordylochele brevicollis*
81	August 1	75 35	65 41	490	0.7		*Boreonymphon robustum*
86	August 4	76 36	68 54	180–80	−1.3		*Nymphon hirtipes, grossipes*
87	do	77 05 05	71 13	790	−0.4		*Boreonymphon robustum; Nymphon strömi; Colossendeis angusta, proboscidea*
94	August 6	77 28 05	68 46	875	−0.4		*Boreonymphon robustum*
97	August 8	78 15 05	73 29	290	−1.05		*Nymphon hirtipes, serratum*
99	do	78 14	74 10	672	−0.5		*Boreonymphon robustum; Nymphon sluiteri, elegans, serratum; Colossendeis angusta, proboscidea*
107	August 14	76 25	69 38	165	−1.2		*Nymphon hirtipes, grossipes, strömi*

APPENDIX TABLE II—Continued

***Godthaab* 1928—Continued**

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
	1928	° ′ ″	° ′ ″ W.	*Meters*	° *C.*		
112	August 16	76 34	74 18	580	−0.5		*Boreonymphon robustum; Nymphon hirtipes, strömi, serratum; Colossendeis angusta, proboscidea*
114	....do	76 40	76 20	85	−1.1		*Nymphon hirtipes, elegans; Pseudopallene circularis*
116	August 17	76 08	80 53	80	−1.05		*Nymphon hirtipes*
119	....do	76 54	81 01	610	−0.6		*Boreonymphon robustum; Nymphon strömi*
131	August 22	74 12	77 00	680	−0.4		*Boreonymphon robustum· Nymphon strömi; Colossendeis angusta, proboscidea*
143	Sept. 5	70 53	54 03	685	1.05		*Cordylochele brevicollis*
160	Sept. 12	68 17	58 14	410	2.55		*Nymphon strömi; Cordylochele brevicollis*
162	Sept. 13	67 48 05	60 48	1,600	−0.4		*Boreonymphon robustum; Cordylochele brevicollis*
166E	Sept. 17	Totness Road, Exeter Sd. [66 19 N]		75–200	−1.6		*Boreonymphon robustum; Nymphon sluiteri*
166c	Sept. 17			abt. 100			*Nymphon hirtipes*
188	Oct. 10	60 22	47 27	120	5.8		*Nymphon hirtipes, serratum*

Capt. R. A. Bartlett, 1926–41; *Effie M. Morrissey* (Hedgpeth, 1943a—with map)

1926	[NW. Greenland]	*Fathoms*				
July 22	Dalrymple Rock					*Nymphon grossipes*
Aug.	Northumberland Island					*Nymphon grossipes*

[Putnam—Baffin Land—Exp.]

1927	Fox Basin					
Aug. 8	45 mi. E. Cape Dorchester					*Nymphon elegans*
Aug. 10	66 30	80				*Nymphon grossipes, elegans; Pseudopallene circularis; Eurycyde hispida*
Aug 12	66 43	80 07	32–37			*Nymphon elegans, megalops; Pseudopallene circularis; Eurycyde hispida*
Aug. 13	66 46	79 15	34–37			*Nymphon brevitarse, grossipes, serratum; Eurycyde hispida; Colossendeis proboscidea*
Aug. 24	67 45	79 09	38			*Eurycyde hispida*

	do	Center, Fox Basin		25				*Eurycyde hispida*
	Aug. 24/25	do		25				*Nymphon grossipes, elegans; Pseudopallene circularis*
	Aug. 25	do		25–31				*Pseudopallene circularis*
	Aug. 26	do		25–31				*Nymphon grossipes, elegans; Eurycyde hispida*
	1930	E. Greenland						
	July 2	Clavering Fjord						*Nymphon grossipes*
	Aug. 30	Angsmagsalik						*Nymphon hirtipes*
	1931							
	July 29	74 21	16 30	46–100				*Nymphon hirtipes*
	July 30	74 04	17 58	120				*Nymphon hirtipes*
				[Peary Memorial Exp.]				
	1932	NW. Greenland						
	July 27	Prudhoe Land						*Nymphon grossipes*
	do	76 32	68 45	12				*Nymphon hirtipes*
	Aug. 28	Kerkoliak, Salveland						*Nymphon grossipes*
				[Norcross-Bartlett Exp.]				
	1933							
	Aug. 3	63 10	85 25		(From floating seaweed)			*Nymphon brevitarse*
	Sept. 3	Fury & Hecla Str		30				*Nymphon hirtipes*
	1935							
7	Aug. 3	75 40	78 50	140–210		g		*Nymphon hirtipes, elegans, Pseudopallene spinipes*
8B	do	75 40	78 55	150–200		m		*Nymphon sluiteri*
	Aug. 4	75 40	78 59	68–120		rky		*Nymphon grossipes*
		NE. Greenland						
	1936							
	Aug. 4	Fr. Josef Fjord						*Boreonymphon robustum*

APPENDIX TABLE II—Continued

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
		° ′ ″	° ′ ″ W.	*Meters*	° *C.*		
		NW. Greenland					
	1937						
	July 28	77 45				rky	*Nymphon serratum*
27	Aug. 2	Bet. C. Alexander & C. Chalon.		25–40		rky	*Nymphon grossipes*
29	do	do		25–40		rky	*Nymphon brevitarse, sluiteri, serratum, megalops*
49	Aug. 7	Northumberland Id					*Nymphon grossipes*
	1938	NW. Greenalnd					
76	July 29	76 03	67 30				*Nymphon hirtipes*
124	Aug. 7	77 45	Murchison Sound.				*Boreonymphon robustum; Nymphon hirtipes, grossipes, elegans, serratum*
126	do	77 45	do				*Nymphon grossipes*
127	do	77 45	do				*Nymphon brevitarse, grossipes; Pseudopallene circularis*
134	do	77 43	do				*Nymphon hirtipes*
135	do	77 42	do				*Nymphon megalops; Pseudopallene circularis*
136	Aug. 7	77 42	do				*Eurycyde hispida*
146	Aug. 8	77 38	do				*Nymphon hirtipes, brevitarse, grossipes*
	1939	S. Greenland					
166	Aug. 24	61	62 30			m., p	*Nymphon hirtipes*
175	Aug. 25	61 10		80–90			*Nymphon hirtipes*
196	do	Cape Farewell		60–70			*Nymphon grossipes*
197	do	do		60–70			*Pseudopallene spinipes*
207	do	do		40–100			*Nymphon hirtipes, grossipes*
208	do	do		60–70			*Pseudopallene spinipes*
210	do	do		70			*Pseudopallene circularis*
218	Aug. 28	do		60–70			*Nymphon grossipes*
	1940	NW. Greenland					
25	July 22	Nr. Conical Rock		25–45			*Nymphon hirtipes*
37	do	do		25–60			*Nymphon hirtipes, serratum*

38	July 23	do		25-60			*Nymphon grossipes*
43	do	Wostenholme Id		12			*Nymphon hirtipes*
44	do	do		13-17			*Nymphon grossipes*
46	do	do		13-17			*Nymphon grossipes*
57	do	do		13-25			*Nymphon grossipes*
	1941						
17		Frobisher Bay		about 60			*Nymphon longitarse*

New York Zoological Society, 1929 (tug *Gladisfen*)[f]

	1929				[deep pelagic tow]		
St. 115, Net 157	June 8	Bermuda circle		1,100		pt. oz	*Colossendeis macerrima*
Net 206	June 22	do		600		pt. oz	*Pallenopsis calcanea*

***Loubyrne*, 1930—Hudson Bay Fisheries Expedition (Hedgpeth 1943a)**

	1930						
19	Aug. 15	61 11	90	136		m., st	*Nymphon hirtipes*
31	Aug. 22	56 10	82 21	75	−2.0	g	*Nymphon serratum*

Coll. G. Préfontaine, 1932, in Gulf of St. Lawrence

	1932			*Meters*			
	July	Trois Pistoles, Quebec		200			*Nymphon sluiteri*

APPENDIX TABLE II—Continued

Johnson-Smithsonian Exp., 1933 (station data Bartsch, 1933, with chart)

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type of bottom	Species of pycnogonids
		° ′ ″	° ′ ″ W.	*Fathoms*	° *C.*		
	1933						
16	Nov. 2	18 29 40 18 31 00	66 08 30 66 10 15	38⅚5			*Endeis spinosa; Pentapycnon geayi*
78	Nov. 25	18 27 30 18 29 42	65 32 36 65 31 15	109⅜00			*Pallenopsis schmitti*

***Mercator*, 1935 (Giltay, 1937)**

	1935	[Rio De Oro]		*Fathoms*			
(1)	Oct. 31–Nov. 1	S. of Garnet Head		10–17			*Nymphon gruveli*
(2)	Nov. 1	do		17			*Nymphon gruveli*
(3)	Nov. 3	Villa Cisneros		12			*Nymphon gruveli*
		[Senegal]					
(4)	Nov. 13	Dakar Bay					*Nymphon adami*
(5)	Nov. 14	Rufisque		12			*Nymphon adami*

***Président Théodore-Tissier*, 1935–36 (Fage, 1942)**

		° ′ ″	° ′ ″ W.	*Meters*	° *C.*		
	1935						
534	July 4	44 54	3 10	1,680–2,770			*Colossendeis macerrima*
	1936						
698	May 12	14 47	17 33	120–145		m., s.	*Nymphon gruveli*
699	do	14 49	17 35.5	160–235		gn. m.	*Nymphon gruveli, prolatum*
718	May 18	10 50	17 06	120			*Achelia langi*
725	May 21	9 24.5	14 16	38			*Endeis charybdaea*
729	May 25	9 21	14 15	35			*Anoplodactylus polignaci, Endeis charybdaea*
741	May 30	13 14	17 30	100			*Achelia langi*
744	June 1	14 22	17 05	15–25			*Nymphon gruveli, Endeis spinosa*
758	June 10	20 03	17 36	100			*Endeis spinosa, Ascorhynchus similis*
769	June 15	24 00	16 48				*Nymphon mauritanicum*

Smithsonian-Hartford Exp., 1937

37	*1937* Apr. 10	St. Croix, Virgin Is. [mangrove roots]						*Anoplodactylus carvalhoi*

Atlantis, 1937–40 (Caribbean data: Chace, 1940, with map)

	1937		W.	*Meters*				
24	Apr. 14	"Gulf, no label."		1,000				*Colossendeis macerrima*
				Fathoms				
(1)	Aug. 11	39 28	71 58	640				*Colossendeis colossea*
	1938							
(2)	Aug. 3	37 43	73 40	1,105				*Colossendeis colossea*
	1939							
(3)	July 26	40 05	68 05	1,105–35				*Colossendeis angusta, minuta*
	1938							
2950	Feb. 3	26 14	78 43	285				*Ascorhynchus armatus*
2981	Mar. 30	22 48	78 48	225				*Ascorhynchus armatus*
3000	Mar. 21	23 10	81 29	170–225				*Ascorhynchus armatus*
	1939							
3384	Apr. 26	22 34	78 00	290				*Ascorhynchus armatus*
3388	Apr. 26	22 32 30	78 09	255				*Ascorhynchus armatus*
3391	Apr. 27	22 34	78 14	220				*Ascorhynchus armatus*
3392	do	22 35	78 16	225				*Ascorhynchus armatus*
3460	Apr. 29	22 47	78 14	261				*Ascorhynchus armatus*
3469	May 9	23 12	81 22	425				*Pallenopsis forficifer*
	1940							
3990	Aug. 14	38 05	73 40	990				*Colossendeis colossea*

Allan Hancock Foundation, *Velero III*, 1939

	1939						
A 15-39	Apr. 8	Outside Bahia Honda, Colombia.	8–9		corallines		*Achelia sawayai; Eurycyde raphiaster*
A 32-39	Apr. 15	10 50 30 | 63 54 30 3 miles north of Coche Id., Venezuela.	21–35		s. & sh.		*Achelia sawayai*

Pelican, 1940

Station No.	Date	Lat. N.	Long.	Depth	Temp. at bottom	Type at bottom	Species of pycnogonids
	1940						
169–7	Jan. 18	28 24.5	80 03.0	45			*Pallenopsis schmitti; Anoplodactylus lentus, insignis, sp.* B

Casoar, 1936, 1938, M. Cadenut, coll. (Fage, 1942)

	Feb. 10, 1936	Off Cap Blanc	90–100			*Nymphon mauritanicum*
	October 1938	Off Rio de Oro	90–100			*Nymphon gruveli*

[a] The station numbers given by Bouvier (1937) do not agree with the numbers on Sanderson Smith's list, or, for that matter, with Bouvier's earlier paper (1916b). Inasmuch as the positions and other data given seem to be correct, I have reassigned the older station numbers. An attempt to make the data agree with Bouvier's numbers, on the supposition that he derived his data from reading the wrong lines of the station record, produced some manifest absurdities, such as a record for *Colossendeis angusta* at 96 fathoms with a bottom temperature of 15° C. (station 93) and an abyssal record of 1,999 fathoms for *Achelia echinata* (station 105). Bouvier's numbers are indicated in brackets. Although not so stated, Bouvier's positions are based on the Paris meridian. The longitudes have been converted to Greenwich meridian.

[b] Many of the records in Stephensen's various papers did not include station numbers or dates. These records were later corrected by the late Doctor Stephensen against the original station lists, and I am glad to acknowledge his assistance in correcting this part of the table and supplying additional data not included in his papers.

[c] Compiled from Stephensen's reports on pycnogonids of Norway and Iceland, based partly on collections made by the *Michael Sars*. Sometimes the locations are specifically referred to as *Michael Sars* stations, but usually only the positions are given. All those which include temperature data are certainly *Michael Sars* stations, and the others appear to be. Unfortunately, complete station records have not been published; hence it has been impossible to assign numbers to most of these records. There are several typographical errors; station ?56 (1900) does not agree with the published record for the 1900 station of that number, which is 71°05′ N., 26°17′ E. These records have been omitted from the index.

[d] The depths in parentheses are those of the bottom at the stations, as given in H. B. Bigelow's "Physical Oceanography of the Gulf of Maine" (Bull. U. S. Bur. Fish., 1924); those not bracketed are from the labels with the specimens. They may represent tow-net hauls at those depths.

[e] By some unhappy coincidence these particular stations are omitted from Charcot's station lists in the Annales Hydrographiques, 1921.

[f] Collected within the 8-mile circle of intensive observations off Bermuda. The center of this circle is lat. 32°12′ N., long. 64°36′ W. Sample data from the above area include a temperature of 3.54° C. (38.4° F.) at 1,089 fathoms.

APPENDIX TABLE III

PELAGIC RECORDS OF PYCNOGONIDS, FROM SARGASSUM IN MID-ATLANTIC

Gauss, 1901 (Hodgson, 1927)

Station No.	Date	Lat. N.	Long W.	Species of pycnogonids
	1901	"South of Azores"		*Anoplodactylus maritimus*

Timmerman, 1932—with map

	1922	° ′	° ′	
1	Nov. 24	36 26	32 19	*Anoplodactylus petiolatus*
2	do	36 22	32 46	*Anoplodactylus petiolatus*
5	Nov. 26	34 25	40 05	*Endeis spinosa*
6	Nov. 27	33 19	43 55	*Anoplodactylus petiolatus; Endeis spinosa*
7	Nov. 28	31 56	48 25	*Anoplodactylus petiolatus*
8	Nov. 29	30 20	53 10	*Anoplodactylus petiolatus*
9	Nov. 30	28 31	56 36	*Anoplodactylus petiolatus*
	1923			
22	Jan. 24	25 10	64 56	*Anoplodactylus petiolatus*
23	Jan. 25	27 09	61 23	*Anoplodactylus petiolatus*
24	Jan. 26	29 26	57 16	*Anoplodactylus petiolatus*
25	Jan. 27	30 50	54 15	*Anoplodactylus petiolatus*
	1922			
41	Oct. 25	41 00	34 00	*Anoplodactylus petiolatus; Endeis spinosa*
42	do	39 30	34 00	*Anoplodactylus petiolatus*
43	do	40 00	40 00	*Anoplodactylus petiolatus*
46	do	29.00	42 00	*Anoplodactylus petiolatus*
47	Oct. 11	27 00	39 00	*Anoplodactylus petiolatus*
	1899			
48	Aug. 3	39 24	57 48	*Anoplodactylus petiolatus*
49	Aug. 2	41 36	56 18	*Anoplodactylus petiolatus*
54		24 00	43–44	*Anoplodactylus petiolatus; Endeis spinosa*

Mercator, 1936 (Giltay, 1937)

	1936	° ′	° ′	
	Mar. 30	30 11	71 08	*Endeis spinosa*

Gulf of Mexico (Sargassum drifting ashore)

	1945	° ′ ″	° ′ ″	
	Mar. 25	27 50	97 02 30	*Tanystylum orbiculare*
	1946			
	Apr. 16	27 52 30	97 01 45	*Anoplodactylus petiolatus*

INDEX TO SPECIES INCLUDED IN THE TABLES

PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM

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NOTES ON SOME ASSASSIN BUGS OF THE GENUS ZELURUS FROM THE COLLECTIONS OF THE UNITED STATES NATIONAL MUSEUM

By Herman Lent[1] and Petr Wygodzinsky[2]

Through the kindness of Dr. Reece I. Sailer, of the United States Bureau of Entomology and Plant Quarantine, we were given the opportunity of examining a small collection of assassin bugs of the genus *Zelurus* Hahn, 1826 (*Spiniger* auct.) from Central and South America. Three species new to science are described herein, and additional morphological notes and locality records of other species are given. We would welcome any additional material of this genus for study.

ZELURUS THORACICUS (Lepeletier and Serville, 1825)

1 ♂, Viçosa, Minas Gerais, Brazil, collected by E. J. Hambleton on December 11, 1930.

ZELURUS CIRCUMCINCTUS (Hahn, 1835)

1 ♂, 1 ♀, Barro Colorado Island, Panama, Canal Zone, collected at light, in May 1941, James Zetek No. 4798, Lot No. 41–11389.

ZELURUS COXALIS (Stål, 1859)

1 ♀, Rio de Janeiro, Brazil, Uhler det. *Spiniger limbatus*, Uhler collection.

ZELURUS STILLATIPENNIS (Stål, 1859)

1 ♂, São Paulo, Brazil, collected by H. L. Parker.

[1] Instituto Oswaldo Cruz, Rio de Janeiro, Brazil.
[2] Instituto de Ecologia e Experimentação Agrícola, Rio de Janeiro, Brazil.

ZELURUS MORDAX (Breddin, 1903)

PLATE 4, FIGURES 1–3

1 ♀, Yurimaguas, Peru, collected by H. S. Parish in March 1920.

The original description is quite sufficient, but in order to facilitate comparison we include drawings of the general aspect of the head (pl. 4, figs. 1 and 2), as well as of the color pattern of the species (fig. 3).

ZELURUS PINTOI (Costa Lima, 1940)

3 ♂♂, Villa Rica, Paraguay, collected by F. Schade in October and November 1934.

ZELURUS JURADOI (Costa Lima, 1940)

PLATE 4, FIGURES 4–7

1 ♀, Tumupasa, Bolivia, collected by W. M. Mann in December 1921 (Mulford Biological Exploration 1921–1922).

The specimen at hand corresponds quite well with the original description. We herewith supplement the diagnosis by including drawings of the general aspect of the head as well as of the clasper and the aedeagus; the form of the basal sclerite of the phallosome is significant.

ZELURUS ? BERGROTHI Lent and Wygodzinsky, 1946

PLATE 5, FIGURES 8, 9

Micropterous female.—Total length, 15.0 mm.; distance between points of humeral spines, 3.5 mm.; maximum width of abdomen, 5.5 mm.

General color of body black. Antennae, corium of microhemelytra except clavus, tibiae except a short basal dark ring, and tarsi orange-colored. The posterior tibiae are lacking in the specimen examined. Connexivum totally yellowish dorsally and ventrally. Bristles very scarce.

General form of head and rostrum as in plate 5, figures 8 and 9. Distance between eyes dorsally 1½ times the width of one eye as viewed in the same plane. Jugae prominent, pointed apically. Genae rounded apically. Length of first segment of antennae, 1.5 mm.; of second, 3.5 mm.

Anterolateral angles of collum laterally produced but not very prominent. Anterior lobe of pronotum with 1+1 strong, rather short, discal spines, as well as 1+1 lateral processes, which are shorter than the discal ones. Both sets are longer than the processes of the collum. Humeral angles with short, strong, acute spines (one shorter than the other in the specimen examined), their length about equal to that of the discal and the lateral spines of anterior lobe. Anterior

lobe smooth, posterior lobe irregularly wrinkled. Median longitudinal groove occupying almost the whole anterior lobe of pronotum, originating at level of bases of discal spines and thus also occupying the anterior three-fourths of the posterior lobe. Distal spine of scutellum strong, acute, being the longest of all thoracic spines. Prosternal processes not very prominent.

Legs of medium length. Femora ventrally without any traces of denticles. Spongy fossa occupying one-third of the total length of the anterior tibia. Femora and tibiae with few bristles, the length of which is not greater than the diameter of the respective structures.

Microhemelytra not reaching posterior margin of second tergite; length, 2.5 mm. Dorsal gland openings conspicuous at posterior border of third, fourth, and fifth segments; a small median tubercle posteriorly on sixth segment. Connexivum inconspicuous dorsally, distinct ventrally. Median longitudinal keel and sutures between ventral segments inconspicuous.

Locality.—Córdoba, Argentina (W. M. Davis).

The specimen differs from *Z. bergrothi* Lent and Wygodzinsky in pronotal and abdominal characters (these may be the result of its brachypterous condition), but chiefly in its pointed jugae, which are similar to those found in *Z. femoralis* (Stål, 1854). However, it seems to us to be more closely related to the former, and therefore we consider it tentatively as the female of *Z. bergrothi*.

ZELURUS SALYAVATOIDES, new species

PLATE 5, FIGURES 10–12; PLATE 6, FIGURE 26

Female.—Length to apex of hemelytra, 12.5 mm.; distance between points of humeral spines, 4.5 mm.; maximum width of abdomen, 4.0 mm.

General color of body pale yellow, partly orange-yellow, with dark piceous design on its surface, as in plate 6, figure 26; only the antennae and the third segment of rostrum uniformly dark piceous.

General form of head as in plate 5, figures 10 and 11; distance between eyes dorsally 1½ times the width of one eye, as viewed in this plane. Anteocular and postocular region separated dorsally by a deep transverse groove. From the center of this groove there arises another short groove directed anteriorly. Jugae and genae rounded apically, not very protruding. Color of head dorsally, yellowish; base of ocelli and the above-mentioned grooves dark brown; laterally with dark-brown stripes before and behind the eyes; the bristles are long, delicate, and erect.

Length of first segment of antennae, 1.0 mm.; proportion of segments one to four, 1 : 3 : 2.8 : 2.4. Rostrum as in plate 5, figure 11; basal half of first segment yellow, apical half dark piceous; the apical two-

thirds of second segment dark-colored; the third segment entirely dark.

Neck with a large dark-brown spot on its posterior half.

Collum with its anterolateral angles quite salient, as in plate 5, figure 10; its color yellow, a median transverse spot dark brown.

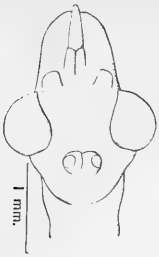
Anterior lobe of pronotum without lateral spines or tubercles; discal spines very long and slender (length, 1.5 mm.), almost vertical. Color of this lobe entirely yellow, only the discal spines and their base brownish. Posterior lobe yellow, with brownish design as in plate 6, figure 26. Humeral angles directed upwardly and backwardly, approximately as long as discal spines of anterior lobe, uniformly dark piceous. Median longitudinal impression occupying the whole anterior lobe of pronotum; the longitudinal carinae short, beginning behind the discal spines and terminating near the base of posterior lobe; the latter with very numerous transverse or irregular wrinkles. Prosternal processes distinct, not very long. Mesosternum with a median Y-shaped carina; metasternum with a transverse carina. Pleura very hairy; hairs long, delicate, and brightly colored. Sterna with similar pubescence.

Scutellum yellow, with a large, median, longitudinal, dark-brown stripe, which reaches and surpasses base of posterior spine; the latter is almost vertical, yellow on its distal two-thirds, and with a total length corresponding to that of the pronotal spines.

Legs slender, not very long, the posterior ones the longest. Ventral face of anterior femora with two longitudinal parallel rows of small dentiform processes, a few noticeably larger than the majority; the rows begin near base and attain the apex; median femora similar. Anterior and median tibiae with numerous small dentiform processes; spongy fossa occupying one-fourth of total length of anterior tibia. Tibia with strong dark bristles, the length of which is two to three times the diameter of said structure. Color of legs distinctly yellow or orange, with brownish annuli. Anterior and median femora with one median, one subapical, and one apical dark ring; posterior femora with one median and one apical ring; tibiae of all pairs with one submedian and one apical dark ring.

Hemelytra attaining apex of abdomen; their design is shown in plate 6, figure 26.

Median longitudinal keel on ventral face of abdomen attaining base of third segment. Connexival margin of second segment with a very small tooth. Delicate long hairs present, not very numerous. General color of ventral face of abdomen pale yellow; sutures between third and fourth, fourth and fifth, fifth and sixth, and sixth and seventh segment accompanied by a transverse dark band, bifurcate at its lateral ends, as in plate 5, figure 12; seventh segment medially



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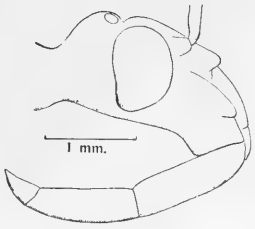

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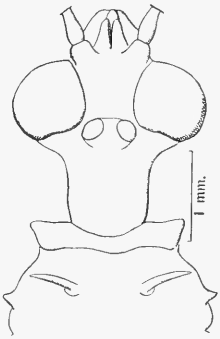

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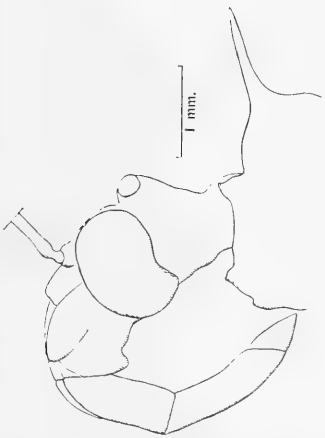

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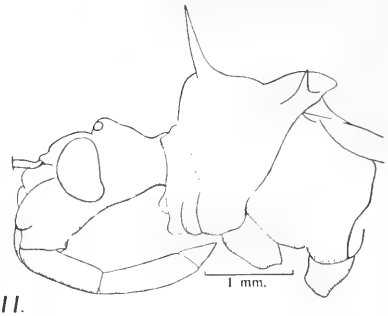
7.

1–3, *Zelurus mordax* (Breddin): 1, Dorsal aspect of head; 2, lateral aspect of head; 3, dorsal pattern.

4–7, *Zelurus juradoi* (Costa Lima): 4, Dorsal aspect of head and anterior part of pronotum; 5, clasper; 6, lateral aspect of head; 7, lateral aspect of phallosoma.

8.



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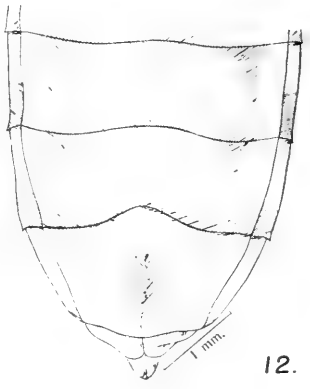

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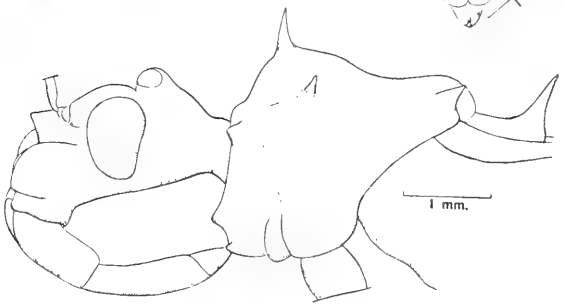

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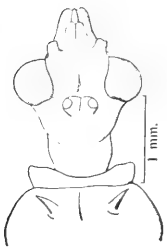

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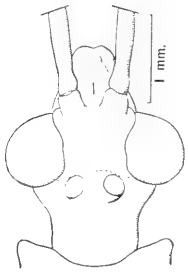

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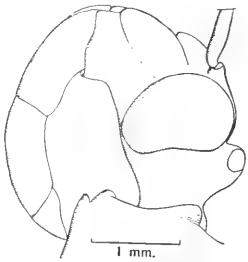
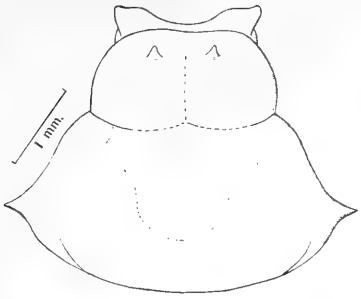


14.

8, 9, *Zelurus ? bergrothi* Lent and Wygodzinsky: 8, Dorsal aspect; 9, lateral aspect of head and prothorax.

10–12, *Zelurus salyavatoides*, new species: 10, Dorsal aspect of head and anterior lobe of pronotum; 11, lateral aspect of head and prothorax; 12, dorsal aspect of posterior region of abdomen.

13, 14, *Zelurus manni*, new species: 13, Dorsal aspect of head; 14, lateral aspect of head.



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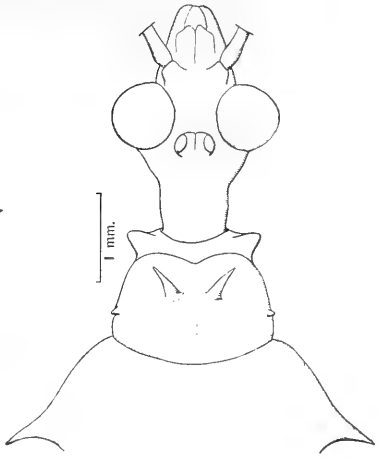

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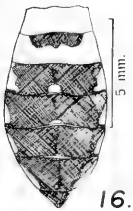

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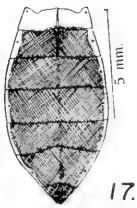

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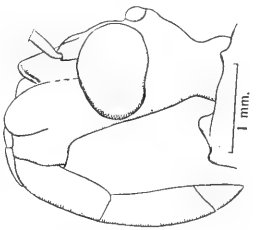

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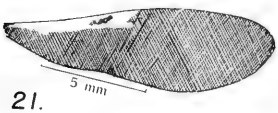

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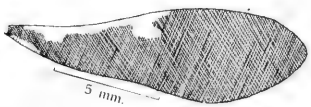

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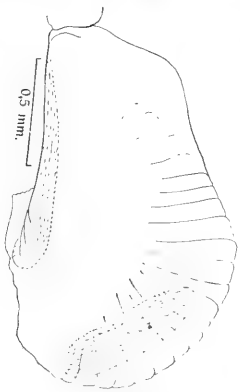

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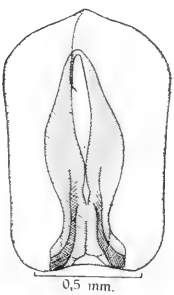
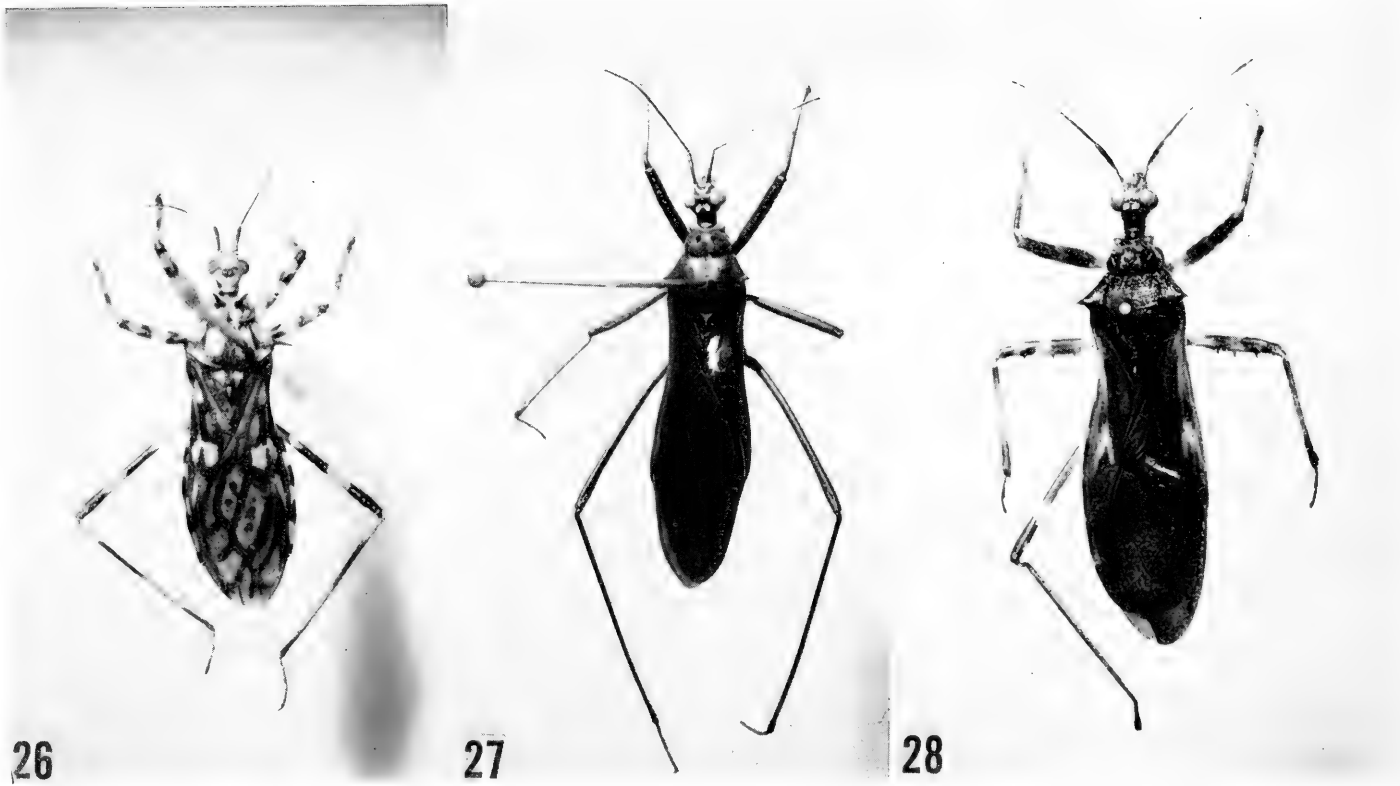


25.

15–17, *Zelurus manni*, new species: 15, Dorsal aspect of pronotum; 16, dorsal aspect of abdomen; 17, ventral aspect of abdomen.

18–25, *Zelurus saileri*, new species: 18, Dorsal aspect of head and pronotum of male; 19, lateral aspect of head of male; 20, anterior femora of male; 21, color pattern of hemelytra, male; 22, color pattern of hemelytra, female; 23, clasper; 24, lateral aspect of phallosoma; 25, basal sclerite of phallosoma.



26, *Zelurus salyavatoides*, new species: Holotype, male.
27, *Zelurus manni*, new species: Holotype, male.
28, *Zelurus sailer*i, new species: Holotype, male.

with a longitudinal dark spot. Connexivum orange-yellow, the posterior half of each segment dark.

Locality.—Cavinas Beni, Bolivia, collected by W. M. Mann in January 1922 (Mulford Biological Exploration 1921–22).

Holotype.—Female, U.S.N.M. No. 57971.

The new species is distinguished by its very peculiar pattern. Superficially the species resembles *Salyavata variegata* Amyot and Serville.

ZELURUS MANNI, new species

PLATE 5, FIGURES 13, 14; PLATE 6, FIGURES 15–17; PLATE 7, FIGURE 27

Female.—Length to apex of hemelytra, 20 mm.; distance between points of humeral spines, 4.5 mm.; maximum width of abdomen, 5.0 mm.

General form of the head as in plate 5, figures 13 and 14; dorsal interocular space as broad as dorsal breadth of one eye. Jugae and genae not very prominent. Head with yellowish hairs on dorsal and lateral face and a row of strong black forwardly directed bristles near insertion of rostrum. Length of first segment of antennae 1.5 mm., of second 6.0 mm. (third and fourth lacking). Rostrum as in plate 5, figure 14, with numerous and conspicuous black bristles.

Pronotum (pl. 6, fig. 15) with anterolateral angles projecting, their tips rounded. Anterior lobe without lateral tubercles; 1+1 short and acute discal tubercles present. Posterior lobe with inconspicuous transverse wrinkles; humeral angles with short acuminate spines, which are directed laterally and slightly upwardly; these spines are somewhat longer than the discal spines of the anterior lobe and somewhat shorter than the spine of the scutellum. Prosternal processes distinct, of medium length. Scutellum short, its spine acuminate, short, almost vertical.

Legs delicate. Anterior femora ventrally with small spines of uniform size, more numerous at base, continuing in a single row to middle. Spongy fossa occupying about two-fifths of total length of anterior tibia; anterior and middle tibiae with delicate dark hairs, which are approximately as long as the diameter of the tibia; those on posterior tibiae more delicate and longer, their length surpassing the diameter of this segment.

Hemelytra surpassing tip of abdomen by 3 mm.; uniformly colored, the veins on corium distinctly dark reddish.

Abdomen as in plate 6, figures 16 and 17.

Locality.—Tumupasa, Bolivia, collected by W. M. Mann in December 1921 (Mulford Biological Exploration 1921-1922).

Holotype.—Female, U.S.N.M. No. 57972.

The new species is obviously very similar to *Z. sagax* (Breddin, 1903) but can be distinguished by the absence of lateral tubercles on

anterior lobe of pronotum and the presence of ventral spines on the anterior femora.

We take pleasure in naming this species for the collector.

ZELURUS SAILERI, new species

PLATE 6, FIGURES 18–25; PLATE 7, FIGURE 28

Male.—Length to apex of hemelytra, 17.0 mm.; distance between points of humeral spines, 4.5 mm.; maximum width of abdomen, 5.0 mm.

General color of body dark piceous, shining, dull on hemelytra; yellowish spots and stripes on the external margin of corium, on the connexivum, on the ventral keel of abdomen, on the apex of pronotal spines, and more or less distinctly on femora and tibiae.

General form of head as in plate 6, figures 18 and 19; distance between eyes dorsally about equal to two-thirds of the dorsal width of one eye. Jugae and genae rounded apically, somewhat salient.

Length of first segment of antenna, 1.8 mm.; the proportion of segments one to three, 1 : 2.8 : 2 : ? Rostrum as in plate 6, figure 19. Neck rather elongate.

Collum with its anterolateral angles not very salient, rounded apically. Anterior lobe of pronotum with its lateral tubercles very small (pl. 6, fig. 18), not very distinct; discal spines long and acuminate, yellow on apical two-thirds, almost vertical, not much longer than humeral spines. Pronotum dark piceous. The following parts yellowish: Spots at the base of anterolateral processes of collum; on anterior lobe of pronotum; lateral carinae, lateral tubercles, discal spines, and discal carinae; on the posterior lobe; lateral margin, humeral spines, and posterior third of the median longitudinal ridge. Posterior lobe with transverse wrinkles.

Scutellum with a long apical spine, directed backward, longer than discal spines of anterior lobe of pronotum; its apical half yellow.

Prosternal processes not very salient.

Anterior tibia with two rows of spines along the ventral surface of the apical three-fourths. A few of the spines are noticeably longer than the remainder (pl. 6, fig. 20). Middle femora of the same type. Anterior and median tibiae with numerous small spines ventrally. Spongy fossa occupying one-third of the total length of anterior tibiae. Femora with three irregular yellow annuli, one basal and two subapical. Tibiae entirely yellowish, darker basally and apically.

Hemelytra slightly surpassing apex of abdomen.

Abdomen ventrally with long and delicate hairs, longitudinal keel attaining the sixth segment, accompanied by a yellow stripe becoming more distinct and larger at the base of each segment. Connexivum ventrally with small yellow spots on the suture between the segments.

Clasper simple, with bristles of moderate size (pl. 6, fig. 23). Basal sclerite of phallosoma of aedeagus as in plate 6, figure 25; phallosoma distally with an interior, transverse sclerite.

Female.—The only female at hand differs by the following characters from the typical male: Pronotal spines longer; yellow design on all parts of the body much more distinct and extensive. Hemelytra attaining apex of abdomen. Ventral keel of abdomen attaining seventh segment.

Localities.—Chaquarapato (2,300 m.), Ecuador, collected by G. H. H. Tate on April 5, 1922 (male, holotype); Balrahamba, Ecuador, collected by F. Campos (female, allotype).

Holotype and allotype.—U.S.N.M. No. 57973.

This species seems to be related to *Z. tricolor* (Lepeletier and Serville, 1825) and *Z. melanochrus* (Stål, 1872); it differs from both in numerous details of its pattern.

We take great pleasure in dedicating this species to Dr. R. I. Sailer, who has done much to help us with our work.

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NEW GENERA AND SPECIES OF ECHIUROID AND SIPUNCULOID WORMS

By Walter Kenrick Fisher

The types of the new species of worms described herein are in the collection of the United States National Museum. I am indebted to Dr. Olga Hartman for the two new echiuroids, to Prof. G. E. MacGinitie for the specimens of the remarkable *Siphonomecus ingens*, and to the Museum of Comparative Zoology for three specimens of *Sipunculus branchiatus* W. Fischer for which I have made a new genus.

Phylum ECHIUROIDEA

Genus THALASSEMA Lamarck

THALASSEMA PHILOSTRACUM, new species

Plate 8

Diagnosis.—Nephridia 4; nephrostome conspicuous, semicircular, without spirals; dorsal blood vessel posteriorly voluminous, the ring vessel at junction of fore-gut with intestine; fore-gut long, longer than the presiphonal segment of intestine; the latter of moderate length; verrucae of skin unequal, low, transversely lengthened, and serially arranged in middle region of body; setae with interbasal muscle, the hook small and sharply curved; lower lip of mouth not formed by thick margin of proboscis, which is ventrally cleft at its base; length 12 to 21 mm.

Description.—Body wall rather thin in expanded parts, slightly translucent; verrucae not prominent, arranged in transverse series in the middle region of body and there transversely elongated. In some

specimens they are larger at ends of body, in others not. Setae of largest specimen 2.75 mm. long, the hook relatively small and sharply curved. The proboscis technically forms the lower lip of mouth, but the thick border is interrupted just ventral to mouth, which is not the case in *hartmani*. There are no localized thickenings of longitudinal muscle layer; inner layer very thin, with satiny luster.

Nephridia 2 pairs, with fan-shaped nephrostome much larger than in *hartmani*. The anal vesicles are slender, about half the length of body; ciliated funnels very small.

The alimentary canal, similar to that of *T. thalassema* (Pallas), has a long fore-gut, two-thirds of which is taken up by the pharynx-esophagus. The gizzard, not well defined, is about equal to the stomach in length. The dorsal blood vessel branches to form the ring vessel exactly at the end of the fore-gut. The succeeding presiphonal portion of the intestine is much longer than in *T. steinbecki* Fisher (Gulf of California to Ecuador), as is also the fore-gut. It is also apparently larger than in *T. thalassema*, but here the difference is not so great. The precloacal intestinal coecum is rather large. The cloaca is distinctly elongate, with translucent walls. The anterior chamber, comprising about half, has a longitudinally plicated mucosa; the posterior or cloaca proper has smoother walls and is separated from the anterior by a constriction. The gland cells surrounding this part of the cloaca of *T. thalassema*, figured by Rietsch (1886, pl. 21, fig. 105) and called the perianal glandular organ by Jameson (1899, p. 555), must be absent or greatly reduced in thickness in *philostracum*, as the walls are everywhere thin and translucent.

The pellets that crowd the intestine are composed of gray mud with clear quartz sand and fragments of shells; the latter are often too large to be included in the pellets.

The vascular system conforms to the *Thalassema* pattern.

Color in life: Body deep red, proboscis white (Hartman).

Type.—U. S. N. M. No. 20802.

Type locality.—Thornton Island, near Englewood, Gulf coast of Florida. Common in muddy pockets of dead shells. Dr. Olga Hartman collector, January 15, 1938.

Specimens examined.—Thornton Island, 24; Lemon Bay Flats, Fla., January 14, 1938, 1, in tip of dead conch; Beaufort, N. C., 1.

Remarks.—This species differs from *T. steinbecki* Fisher (1946, p. 230, fig. 11) in having a much longer fore-gut and a much longer presiphonal segment of the intestine. In *steinbecki* the gizzard and stomach are very short, the nephrostome is of the same shape but smaller, and the anal vesicles longer. Both species have a small seta hook, that of *steinbecki* being more angular, as if the tip were bent at right angles to the shaft.

The ecology of *T. philostracum* is different from that of *T. thalassema*, which Lankester describes as living (on the south coast of Devonshire) in galleries excavated in the red sandstone by the lamellibranch *Gastrochaena*. There is probably some difference in the dimensions of the fore-gut, that of *philostracum* being slightly longer. Judged by Rietsch's figures (1886, pl. 21, figs. 96, 99) the nephrostome of *thalassema* is much smaller. His figures of specimens taken at Concarneau indicate that the margin of the proboscis very definitely forms the lower lip (figs. 92, 93), but Jameson (1899, p. 545) states: "The mouth lies at the base of the proboscis, the lateral margins of which meet but do not fuse ventrally. That is to say the under lip belongs to the body and not to the proboscis." The structure of the cloaca appears to differ as mentioned in the description.

There is no indication in alcoholic specimens of a division of the body into three regions, as is said to be characteristic of *thalassema* (Leigh-Sharpe, 1928, p. 499).

THALASSEMA HARTMANI, new species

PLATE 9

Diagnosis.—Nephridia 2; nephrostome pedunculate, inconspicuous, without trace of spirals; dorsal blood vessel posteriorly voluminous, encroaching upon intestine, the ring vessel being distal to junction of fore-gut with intestine; segment of intestine between end of fore-gut and beginning of siphon exceedingly long, equaling or exceeding length of extended specimen; skin papillae numerous, elongate, unequal, not obviously in serial arrangement or larger at ends of body; setae with interbasal muscle, the hook not sharply bent; lower lip of mouth formed by flange of proboscis. Type: Length 40 mm; proboscis, 8 mm.

Description.—Body wall thin in expanded specimen, slightly translucent; papillae prominent, unequal in size, the larger being swollen squamiform and bent anteriorward; no evident serial alinement; setae 3.5 mm., with broadly curved flattened, tapering ends; proboscis fleshy, forming thick under lip to mouth; no localized thickenings of longitudinal muscle layer; inner layer very thin, with satiny luster.

The single pair of nephridia are small in the type; the nephrostome is simple and represents only the slightly expanded end of its rather long peduncle, which springs from the base (anterior side) of the nephridium. The anal vesicles are relatively very small with tiny ciliated funnels.

A characteristic feature of this species is the extremely long segment of the intestine that precedes the siphon—far longer than in any known species of *Thalassema*, s. s. It is not possible to measure this accurately, but it is of the order of five times the length of fore-gut. The fore-gut seems to lack a stomach, or crop, behind the gizzard. The

latter extends to the beginning of the intestine, which is marked by the ciliated groove. The long intestine, which is filled with ellipsoidal pellets of mud, has no features characteristic of this species. The precloacal intestinal coecum is very tiny.

An unusual feature of the vascular system is the prolongation of the dorsal vessel beyond the fore-gut onto the intestine. This "heart," as it is sometimes called, passes from the dorsal side of the fore-gut to the ventral side of the intestine, which it practically envelops. As will be seen from the figure, the dorsal mesenteries (pl. 9, M^1) of the intestine actually are attached to the ventral side of the body wall near the nerve cord. This results in a twisting of the intestine whereby the dorsal blood vessel becomes ventral in position, while the ciliated groove, which should be ventral, becomes dorsal. In consequence the neurointestinal blood vessel (B^2, B^3) is dorsal in position when it leaves the intestine, instead of ventral as in most echiuroids. The ciliated groove passes through the ring vessel (B^2), a very rare occurrence. In the neurointestinal vessel is a small passage for the interbasal muscle of setae.

Color in life, reddish.

Type.—U.S.N.M. No. 20801.

Type locality.—Beaufort, N. C., June 1940. Dr. Olga Hartman collector, 2 specimens.

Remarks.—A specimen in poor state of preservation was dredged by the *Fish Hawk* in Chesapeake Bay, off Rappahannock Spit (station 8846) August 23, 1920, 12.8 fathoms.

Phylum SIPUNCULOIDEA

Genus SIPUNCULUS Linnaeus

SIPUNCULUS POLYMYOTUS, new species

PLATE 10

Diagnosis.—Differing from *S. nudus*, which it resembles in general form, in having 53–61 longitudinal muscle bands instead of 32–33, a shorter introvert, and a fasciculate cerebral organ and in lacking a conspicuous anterior lobe at base of nephridium.

Description.—Length 300 mm.; introvert 25 mm.; thickness of cylindrical body 28–38 mm.; of base of papillose introvert 15 mm. Longitudinal muscle bands of type 53 to 55; muscle annuli 200, much broader at extremities of body than at middle. The posterior extremity may be either very blunt or bluntly pointed (as in *robustus*). The introvert is relatively short and closely beset with posteriorly directed, blunt, small papillae, which decrease in size toward the mouth. The largest, on the posterior part of the introvert, are 0.5 to 0.75 mm. long. The four tentacles are relatively small, the two

dorsal larger (5 mm. much contracted) than the two ventral. They are subpalmate, the border subdivided into compound, short, grooved, bluntly pointed lobes, which fold easily when contracted. The base of the tentacles is surrounded by a narrow-margined collar free from papillae. At its anterior margin, between the bases of the two dorsal tentacles, is a small pore. The anal aperture is 28 or 29 muscle rings from base of introvert. The nephridiopores are six or seven rings in front of anus. The skin canal system is clearly apparent from the outside, as the interval between any two longitudinal and circular muscles is filled with eggs that are visible through the cuticle and in other places is occupied by air bubbles that can be forced along a continuous canal between two longitudinal muscles.[1]

Interiorly the longitudinal muscles form closely placed ridges, higher than wide, especially anteriorly, and are marked by lighter and darker transverse stripes. The stout retractor muscles, attached at about same level three muscle rings behind anus, are free from one another. The origin of the left ventral spans muscles 2–8; the right ventral, 2–7 or 3–8; the left dorsal spans 16–20 or 17–22; right dorsal, 19–24. The rectum passes mesially between these two dorsal retractors and opens just in front of their body-wall attachment; while the fan-shaped muscle of rectum is attached to the body wall ventral to and in a line with the left dorsal retractor origin and just behind the right dorsal, extending ventralward to outer edge of right ventral. Attached to the posterior face of this thin muscle sheet on each side of the rectum is a delicate linear structure made up of whitish minutely racemose elements (the "Zottenbildung" of Selenka). There is a very slender spindle muscle attached just in front of anus, which passes along the ventral side of the hind-gut, to which it is attached by numerous strands, and follows this distal portion of the intestinal U nearly to end of body, where it is attached to the intestinal wall at the third left-hand bend from the distalmost.

The alimentary canal is fastened, in an open spiral, to the body wall by numerous frenula.The descending or proximal spiral does not proceed directly, for near the anterior third or the middle of animal it bends (at *Y*, pl. 10, fig. 1) and proceeds spirally forward to *X*, then backward in a regular spiral to end of body, making about ten left-hand turns to the final distal bend into the ascending spiral. The latter makes about ten right-hand turns to rectum. A ciliated groove with thickened rims runs the length of canal from anterior end of esophagus to the small coecum, about 25 mm. posterior to anus. The mucosa of the esophagus has very fine transverse folds,

[1] Théel (1905, figs. 146, 147) shows the relation of these canals to the body musculature for *S. priapuloides*. Although Spengel (1912) was reluctant to suggest the function of the skin canals, that of respiration seems to be obvious in an animal with a thick muscular body wall.

but beginning at O^1 the lining is coarsely plicated longitudinally, and these rapidly become more strongly marked (unless wall is inflated). Toward the end of the descending spiral they gradually fade out.

The thick collapsed nephridia, about 40 mm. long, have the walls fortified by an irregular net of stout muscle bands. The intervals are inflated into shallow pockets of various sizes, having the appearance externally of miniature cauliflowers. The nephrostome, on the anterior side of base, is between muscles 11–12 (left) and 12–13 (right). In the paratype this is reversed. There is not a marked anterior lobe of nephridium projecting forward over the nephrostome as in *nudus*.

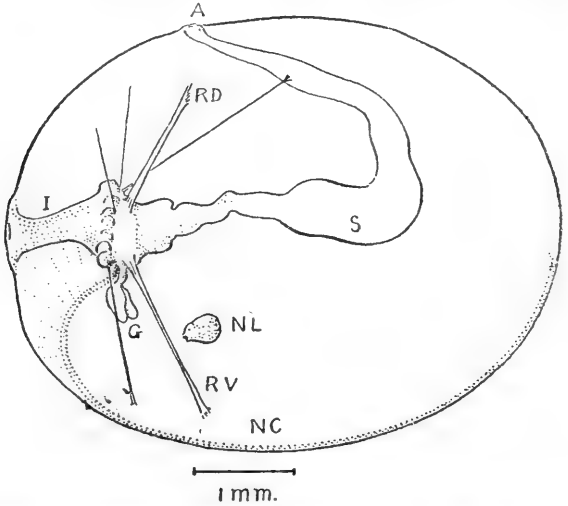

FIGURE 54.—Larva of *Sipunculus polymyotus*, new species, from left side, ×20: The retractor muscles attached to body wall and head region are of the left side only. Muscle bands of body wall omitted. (*A*, anus; *G*, glands; *I*, introvert, with nerves from nerve cord *NC; NL*, left nephridium; *RD*, dorsal retractor, *RV*, ventral retractor; *S*, stomach-intestine; the muscle strand apparently attached to it is fastened to the body wall.)

The dorsal vessel is either finely papillated or smooth and extends backward as far as the posterior edge of the mesenteries that anchor the esophagus to the ventral retractors. The ventral vessel is smaller, is not quite so long, and contains light-yellow material.

Anteriorly the nerve cord is held between two strong ventral paraneural muscles. On the anterior border of the brain is an astonishingly large, pale yellowish cerebral organ (frons), the subdivisions either very slender or flattened, thin, and digitate (pl. 10, fig. 2). The longest are 3.5 mm. In *S. nudus* the frons is a transverse pad.

Color of specimens preserved in formalin, madder brown; alcoholic specimen, faded buff ("museum color").

Larvae.—A considerable number of *Sipunculus* (*Pelagosphaera*) larvae were taken in tow nets by the *Bache*, between January 28 and March 21, 1914, in an area between the Straits of Florida, Bermuda, and the Gulf Stream off Cape Hatteras, at depths of 150 meters to surface. These larvae, in formaldehyde, are nearly transparent, are usually ellipsoidal but sometimes subspherical, and vary in size from 3 by 2.25 mm. to 6 by 4 mm. With one exception they are in about the same stage of development (fig. 54).

All the specimens have the introvert contracted. They are covered by an excessively thin iridescent cuticle, beneath which 56 longitudinal muscle bands extend from pole to pole. These bands are translucent and about twice as broad as the transparent skin between. Only one specimen was found to have developed visible ring muscles. These occur in the area posterior to anus, while the region in front is a little lengthened and constricted so that the larva has a fat vase-shaped form. There is no difference in the internal organs.

The reason for suspecting that these larvae may be *Sipunculus polymyoius* is, of course, the number of muscle bands.

The coelom is very spacious and filled with fluid. In addition to the four retractors there are eight very delicate strands arising in front of the insertion of the retractors and shown only for the left side in figure 54. The ventral retractor is attached between longitudinal muscles 5 and 6 or 6 and 7; the dorsal between 20 and 21 or 21 and 22; The strand that meets the body wall behind the dorsal retractor is attached between 21 and 22 or 22 and 23. The small nephridium opens between 11 and 12, varying to 13 and 14. The nerve cord at its anterior end, where it is free from close contact with the body wall, is already characteristically sipunculoid. The brain is well hidden.

Harold Heath (1910) has described and figured a quite different *Pelagosphaera* from Monterey Bay, Calif., which is undoubtedly a sipunculoid. It is spherical, 2.5 to 3.5 mm. in diameter.

TABLE 1.—*Localities at which larvae of* Sipunculus polymyotus *were taken by the Bache 1914*

Date	Station No.	Position	Depth	Salinity	Temperature
			Meters	*Percent*	° *C.*
Jan. 28	10161	35°27′ N., 73°14′ W	110–0	36.38	21.50
Jan. 29	10162	34°41′ N., 73°23′ W	150–0	36.44	19.30
Jan. 31 and Feb. 1	10169	32°29′ N., 71°29′ W	50–0	36.44	18.95
Feb. 5	10176	32°30′ N., 65°48′ W	50–0	36.44	19.20
Feb. 17, 18	10178	32°20′ N., 64°21′ W	50–0	36.42	18.80
Feb. 28	10195	29°00′ N., 76°23′ W	100–0	36.49	21.70
Mar. 18	10200	23°32′ N., 81°48′ W	75–0	35.93	24.78
Mar. 21	10207	27°32′ N., 79°21′ W	100–0	36.7	23.70

In the lot from *Bache* station 10200 there is a subspherical *Pelagosphaera* of a different species. The body wall is brown and opaque, the muscle bands (difficult to count) apparently not over 15.

Type.—U.S.N.M. No. 20612.

Type locality.—Key West, Fla., two specimens.

Specimens examined.—In addition to above, one from *Pelican* station 193–10, latitude 33°20′ N., longitude 78°11′05″ W., off Long Bay, S. C., 15 fathoms, March 8, 1940 (with eggs).

Remarks.—This species belongs to the *nudus-priapuloides* section of Selenka's key (1883, p. 13) except in the matter of longitudinal muscle bands, which are much more numerous than in any known species of *Sipunculus*.

The specimen from off South Carolina has 60 or 61 longitudinal muscle bands. The left ventral retractor origin spans muscle bands 1–10 from nerve cord while the right spans 2–9.

SIPUNCULUS GALAPAGENSIS, new species

PLATE 11

Diagnosis.—Size large; body wall thicker than in *S. nudus*, with 41 or 42 much stronger muscle bands; squamiform papillae of introvert *larger anteriorly than posteriorly;* papillose area not sharply demarked posteriorly; tentacular crown with very numerous small ultimate divisions, the two dorsal clusters obviously larger than the five others; longitudinal muscle bands with thin, lobate, dorsal crests adjacent to base of long slender nephridia; brain with a conspicuous cerebral organ; no spindle muscle. Related to *S. multisulcatus* W. Fischer.

Description.—Length (considerably contracted) 320 mm., introvert 30 mm.; thickness of cylindrical body, 15 to 22 mm.; of collar behind tentacles, 10 mm. Longitudinal muscle bands 41 or 42; muscle annuli about 170. Posterior extremity blunt, apparently not normal. Introvert is closely covered with posteriorly directed, blunt, leaflike papillae, which are larger anteriorly, although the reverse is commonly the case in *Sipunculus*. The longest are 1.5 mm. There are about seven primary bunches of tentacular lappets; the two dorsal, which are branched, are much larger than the two lateral and three ventral. Back of the tentacles is a narrow zone free of papillae at the anterior margin of which, between the two dorsal groups of tentacles, is a conspicuous crescentic pore with an anterior valvelike lip. The anal aperture is 25 or 26 muscle rings behind the posteriormost introvert papillae, while the nephridiopores are nine rings in front of anus. The skin-canal system is not apparent from outside as the cuticle is separated from skin owing to sojourn in a fish.

Interiorly the strong longitudinal muscles form closely placed ridges much higher (5 mm.) than thick (1 mm). The ring muscles and entrances to skin canals cannot be seen unless these are spread apart. In *S. nudus* the ring muscles and skin-canal pores are ordinarily visible when the dissection is pinned out flat. The short retractor muscles are free from one another. The origin of the ventral, slightly in advance of dorsal, is from muscle bands 2–5; and of the dorsal from 12–16. The grooves between the muscle bands continue, in shallower depth, upon the retractors. The rectum passes mesially between these two dorsal retractors and opens a short distance in front of their origin. From each side of rectum a short strong muscle (not fan-shaped as in *polymyotus*) is fastened to the longitudinal muscles at base of dorsal retractors. Selenka's "Zottenbildung" is reduced to a mere filament. No spindle muscle.

The curious posterior and anterior loops of the postesophageal intestine (a generic character) are more like those of *nudus* than of *polymyotus*. In the latter species the anterior loop (*x*) is attached to the right side of the body, not to both sides as in *nudus* and *galapagensis*. An inconspicuous ciliated groove is present in the esophagus but does not reach the coecum as in *nudus* and *polymyotus*. The intestinal spiral is too macerated for one to determine where the groove ends.

The nephridia are slender free tubes 80 mm. long. There is a slight forward diverticulum at the base above the broad nephrostome. The nephridiopore opens between the fourth and fifth muscle bands. On each side of the base of the nephridium the muscle bands have thin, lobed crests (pl. 11, fig. 2).

The dorsal and ventral blood vessels lack papillae and extend slightly beyond the mesenteries that anchor the esophagus to the dorsal retractors; the esophagus is not attached to the ventral retractors.

Anteriorly the nerve cord is held between two strong paraneural muscles, which are derived from the crest of the first longitudinals, with which the paraneurals merge behind the introvert. The brain, like that of *polymyotus* (and unlike that of *nudus*), has a large cerebral organ consisting of two very irregular, folded sheets of tissue. The brain is less conspicuous superficially than in *polymyotus*.

Color in alcohol, uniform yellowish brown.

Type.—U.S.N.M. No. 20835.

Type locality.—Indefatigable Island, Galápagos Islands, Pinchot South Seas Expedition, July 8, 1929. From stomach of fish.

Remarks.—This species has the same number of muscle bands as *S. multisulcatus* W. Fischer (1913, p. 93, Santos, Brazil), which differs in having rows of dark pigment spots in the longitudinal furrows; dorsal retractors span muscle bands 16 to 18; nephridia open six

(not nine) rings in front of anus, between the fifth and sixth muscle bands. No mention is made of the cerebral organ or of the peculiar dorsal crests of the muscle bands adjacent to the nephridia. The nephridia are described as being short and bright brown, but in *S. nudus* the color in preserved specimens varies from pale pink to deep brown and the length from short to long. In a specimen from Florida the left nephridium is 80 mm. long and the right only 15 mm. It is therefore unsafe to rely on dimensions for specific characters. A feature of *galapagensis* that may be of some systematic value is the attachment of the retractors to body wall. They do not fan out with a clear-cut posterior margin as if superimposed on the underlying muscle bands as in *nudus*. Instead, the deep grooves between the muscle bands of the body wall are continued for a varying distance upon the retractors, which are thus at their base subdivided into distinct fascicles.

XENOSIPHON, new genus

Diagnosis.—Differing from *Sipunculus* s. s. in the following particulars: An extra pair of muscles, functioning both as retractors and protractors, arising from posterior border of introvert and inserted in front of brain, rectum unusually long, the anus being in front of nephridiopores, postesophageal intestine without a long forward loop, spindle muscle arises from wall of rectum, nephridia long, slender, attached to body wall for nearly their entire length, squamiform papillae of the very short introvert increasing in size toward the tentacles, which have very many leaflets arranged in subtriangular pads surrounding the mouth, type species with papilliform dermal outgrowths.

Genotype, *Sipunculus branchiatus* Fischer.

Remarks.—This genus is instituted for the highly peculiar species described below. It cannot be determined whether the skin papillae are of generic significance since Spengel found the skin-canal system to vary considerably within the *indicus* group. The papillae may represent a further development to increase respiration surface.

XENOSIPHON BRANCHIATUM (Fischer)

PLATE 12

Sipunculus mundanus var. *branchiatus* W. FISCHER, 1895, p. 3, pl. 1, figs. 1, 1a, 2.

Sipunculus branchiatus SPENGEL, 1913, p. 74.

Description.—Length, 310 mm., introvert and tentacle crown, 20–25 mm., thickness of cylindrical body, 8, 12 mm., this varying according to constriction of ring muscles. The specimen from La Paz, 420 mm. long, is constricted in the middle of body to 8 mm. diameter. Longitudinal muscle bands 29–34 (Panama specimen, 32–34), only

rarely anastomosing. When body is fully inflated the longitudinal and circular muscles divide the surface into flat rectangular areas separated by rather inconspicuous grooves, but when constriction takes place there is apparent a series of more or less convex annuli. The middle third of body, except for a ventral zone, about six muscle bands in width, is closely covered with slender pointed papilliform outgrowths of the cuticle, 1–1.5 mm. long, which give a furry appearance to the skin. These papillae are continuous with irregularly zig-zag subcutaneous canals, above which the cuticle usually forms slight welts, which have a direction oblique to the longitudinal axis of the dermal rectangles. Each rectangle has its own canal, independent of the others (pl. 12, figs. 4, 5). Beyond the papuliferous area these canals, or more properly spaces as they are usually branched, can be traced forward half the distance to head and also posteriorly as they are often self-injected with yellowish material from the coelom. On the periphery of the papuliferous area a papilla usually appears first at the anterior end of the canal; next at posterior end; then in between, until there are four or five to each rectangle. Brown or yellow finely divided material, which is sometimes loose in the canals, is also found in the bottom of the papillae. If the top of the canal is stripped off, a pore at each end is seen to lead deeper into the tissue (arrows in pl. 12, fig. 4). If ordinary ink is forced *from the coelomic side* into the pores that exist at intersection of longitudinal and transverse muscle bands, it appears in these pores at the ends of the subcutaneous canals but is usually blocked by material already in the canal. The papillae are highly iridescent in sunlight. The area strongly reminds one of the papularium of a sea-star and the function is probably the same.

The terminal knob of the body is very short, broadly rounded to subtruncate and the slight margin is capable of disappearing under distension. There is a conspicuous terminal pore, and the skin, either smooth or longitudinally ridged, is closely beset with microscopic pores of at least two sizes.

The short introvert is covered with squamiform papillae, which increase in size toward the front, near which they decrease over a narrow zone to the bare zone behind tentacles. The largest papillae are 0.75–1 mm. in length and breadth.

The tentacles are composed of very numerous small, grooved, foliate elements in subtriangular mats or groups, radiating from the mouth, which is ventral to the center. There are seven of these from which ridges of tissue converge to the mouth, the odd one being the middorsal and much the largest, two are dorsolateral, two lateral, and two ventral. On the periphery of the crown the space between the major groups is filled in with one to three small

groups of tentacles, which probably increase in number as growth proceeds.

The anus is equivalent of about five muscle rings (not clearly differentiated) behind the posterior papillae of introvert.

Interiorly the longitudinal muscles form flat bands becoming angular in section only when the body is much constricted. The introvert and four retractors occupy about one-seventh of the body length. The retractors are free from one another and arise at approximately the same level: Both ventrals from muscles 1–4, while both dorsals arise obliquely from muscles 7–11. The two protractors arise from muscles 12–15 at the posterior border of the introvert. Before insertion, 4 mm. in front of the brain, they pass over the dorsal retractors. Their form and position when the introvert is out and in are shown in plate 12, figures 1 and 2. The rectum passes far forward and opens close behind the (dorsal) origin of the protractors. (Muscles 17 and 18 are the two middorsal in figure 1; 18 and 19 are really 17 and 16 of the left side.) The rectum lacks a thin fan-shaped muscle. A very slender spindle muscle arises from the ventral wall of rectum, 20–24 mm. behind anus, and proceeds backward following the gut; 10–12 mm. from its origin is a very small coecum to which it is attached. The rectum is fastened dorsally to the body wall by a continuous mesentery, as far back as the two lateral anchors just behind the origin of the spindle muscle. These short lateral strands of tissue fan out slightly and may be rudiments of the rectal fan-muscle. At any rate, to them is attached the ends of a delicate filament, forming a loop, which on each side passes obliquely ventralward along the origin of the dorsal retractors. Here the thread is thickly beset with delicate racemose structures (poorly preserved). These quickly thin out posterior to the muscles, and the rather long posterior loop is very delicate, translucent, and more loosely attached to the coelomic epithelium. Probably the "bandförmiges Organ" figured by Selenka (1883, p. 109, pl. 12, fig. 174 *y*) in *S. mundanus* is a fragment of a similar structure. It resembles a gonad but may be a more extensive "Zottenbildung."

The alimentary canal is macerated, but it appears to lack the forward loop which complicates the anterior end of the spiral of *S. polymyotus*. Although in plate 12, figure 1, the esophagus is drawn to the right, it naturally turns to the left, for its first attachment to the dorsal wall is by separate frenula, along muscle 9 (or 8) of the *left* side. The mesentery between the esophagus and the left dorsal retractor extends posteriorly only about half as far as the right. This shorter left mesentery allows the ventral vessel to become sinistral, while the dorsal vessel gradually becomes dextral. Both end dorsolaterally at the beginning of the dorsal frenula. From

here the canal passes backward along muscle 9 for an unknown distance before starting the spiral. The spirals are well established in the posterior half of the body

Nephridia are long, slender, and except for a short terminal portion are closely attached to muscle 5.

The nerve cord is slender, less than half the width of muscle 1. Anteriorly the rather slender paraneural muscles arise from muscle 1, 4–5 mm. behind nephrostome. The bilobed cerebral ganglion has across the front a prominent frons (cerebral organ) composed of short bushy elements, exactly resembling a very tiny cauliflower.

Color in alcohol faded yellowish; the La Paz specimen is gray varied with straw color.

Type locality.—Esmeraldas, Ecuador.

Specimens examined.—Panama (Hassler Expedition), 3 specimens. La Paz, Baja California, Lyman Belding collector, 1 specimen.

SIPHONOMECUS, new genus

Diagnosis.—Resembling *Phascolosoma* but very large, the longitudinal muscle layer divided into stout bands, either freely or rarely anastomosing; between the strong circular muscle bands there are discontinuous, transverse, coelomic lacunae, which connect with subcutaneous pockets, longitudinally oriented, one for each rectangle of the skin; retractors 2 or 4; anus a short distance behind nephridiopores; nephridia slender, free; spindle muscle strong, firmly anchored at posterior end of body; type with simple spinelets on introvert; tentacles similar to those of *Phascolosoma.*

Genotype, *Siphonomecus multicinctus*, new species.

SIPHONOMECUS MULTICINCTUS, new species

PLATE 13

Diagnosis.—Size very large; longitudinal muscles of postsiphonal region divided into anastomosing bundles; retractors 2, originating near middle of body; introvert about one-third length of body, its anterior end with about 28 circles of very small spines; tentacular crown with eight primary divisions, and numerous subdivisions; Spindle muscle strong, forked at its origin behind anus, and firmly attached to posterior end of body; anus opening far behind introvert and a very short distance behind nephridiopores. Total length 510 mm.; introvert 150 mm.; thickness of body at posterior end of retractors about 25 mm., and of the terminal 200 mm. (constricted and annulated) 10 mm.; breadth of tentacular crown, 7 mm.

Description.—The skin is pale brownish and rather closely peppered with low, brown papillae about 0.25 mm. broad. These have a circular-convex whitish center about 0.06 mm. broad. They appear to the naked eye simply as brown dots, 1 to 4 to each oblong rectangle of the skin, which is rather coriaceous but not rough. Be-

tween the skin and circular muscles is a system of parallel, longitudinal canals about 0.5 mm. in diameter in the posterior constricted region. They lie close together and apparently are not continuous between two annuli; air bubbles in the transverse, or circular, intermuscular coelomic spaces (described below) can be forced into them. They are thus a series of peripheral, longitudinally oriented, subdermal coelomic spaces, fed by the intermuscular discontinuous ring canals, which in turn open into the coelom, between the longitudinal muscle bands.

The anterior end of introvert is thin-walled and translucent. The first 20 mm. is armed with spines (pl. 13, figs. 3, 4) in about 28 circles. They decrease in size posteriorly and persist a little farther on the dorsal than on ventral side of introvert. The longest are 0.34 mm. and are nearly straight; sometimes the tip is curved slightly backward, or forward. The shorter posterior spinelets are usually curved backward (pl. 13, fig. 3).

The tentacular crown is voluminous. There are eight pinnate groups. Plate 13, figure 5, is a diagrammatic plan of the furrows leading to the mouth. These are bordered on each side by five to seven grooved pinnae. It is the swollen, raised border of these pinnae (not indicated in fig. 5) that gives the characteristic form to the tentacles of *Phascolosoma* (Théel, 1905, pl. 14), which these closely resemble. The two ventral tentacles are bifurcate. Between the two dorsal tentacles is the conspicuous nuchal organ, around the anterior border of which is a double fold of skin and a deep groove.

The inner, longitudinal muscle layer is pale pink, of a satiny luster, and smooth throughout the long introvert, although wrinkled transversely. In the succeeding *inflated* region it is divided into unequal, freely and irregularly anastomosing flat bands. The narrow spaces between these bands are crossed by slender, subequal fascicles of the adjacent circular layer. The intervals between the *circular* bands (which anastomose) are the entrances to the transverse intermuscular lacunae, or discontinuous canals, which in turn feed the subcutaneous system of lacunae. Along the fissures between the longitudinal muscles, irregularly distributed, are dark reddish, convex, ellipsoids, 1–1.5 mm. long. A few are found on the muscles.

In the constricted, annulated, posterior region, the longitudinal muscles only occasionally anastomose. They form conspicuous, narrow, closely placed ridges 18 to 22 in number. By reason of their extreme contraction the circular muscles are very much thicker than anteriorly. Each annulus, marked by deep grooves, contains half of two bundles of circular muscles, because the deep constriction divides the muscle nearly in two (pl. 13, fig. 6). In the middle of the annulus is the transverse lacuna. The connecting outlets to

general coelom, one between each pair of longitudinal bands, form regular transverse series following the lacunae between the muscle bundles of each annulus.

The retractor muscles originate close to the nerve cord, somewhat anterior to middle of postintrovert region and span three or four of the longitudinal muscle bands. Posteriorly the retractors are ventral or ventrolateral to the esophagus; anteriorly they become more and more dorsal, until in the region of the introvert hooks they cover the esophagus and fan out at the base of the tentacles.

The nephridia are slender, free, and open about 10 mm. from nerve cord, nearly midway between base of retractors and posterior margin of introvert. The nephrostome has a slightly expanded, crescentic upper lip.

The long esophagus is attached closely to retractors by lateral mesenteries as far back as the sharp bend of plate 13, figure 2. The posterior edge of the right mesentery is a muscular cord produced for a short distance posteriorly on ventral surface of esophagus, while that of left mesentry runs along dorsal side. The dorsal contractile vessel is slender, without diverticula, and ends in a small bulb, where the spindle muscle branches.

Plate 13, figure 1, shows the relations of esophagus, rectum, and spindle muscle. The last sends a branch forward on the esophagus, which ends in an attachment to body wall (*F'*), while the principal stem, turning posteriorly, lies within the coils of the gut. There is a tiny coecum where the esophagus and the rectum first cross. At this point a long slender frenulum (*F*) anchors the rectum to the body wall at midventral line. The spindle muscle is attached strongly to the posterior end of the body. If the intestinal coil had not been forced into the inflated part of the specimen, it would have extended to + in plate 13, figure 2. The free part of spindle muscle, beyond end of intestinal coil, *is as long as the constricted posterior region of plate 13, figure 2.*

The brain is very far forward, at base of the dorsal tentacles, and appears as a transversely elongate yellowish patch without obvious detail.

Color in alcohol: Anterior part of introvert grayish pink, the body bleached yellowish and pinkish brown.

Type.—U.S.N.M. No. 20911.

Type locality.—Key West, Fla., Chester Thompson collector, 1 specimen.

SIPHONOMECUS INGENS, new species

PLATES 14, 15

Diagnosis.—Size very large; body slender, either uniform in thickness, or posterior portion contracted, with an attenuate extremity; introvert long; skin smooth, with numerous tiny sunken glands

(absent from introvert); longitudinal muscle layer of postintrovert region divided into 21 to 23 muscle bands, rarely anastomosing; four retractors, the dorsals arising well in front of ventrals, which are separated from the nerve cord by two or three muscle bands; postretractor region about half body length; strong spindle muscle arising in front of the anus and attached at the posterior end of the body; intestinal spiral very long (60 to 62 coils); contractile vessel densely papillated posteriorly; nephridia free, opening a short distance in front of anus; small coelomic papillae forming a transverse zone in front of nephridia; tentacular crown capitate; tentacles arranged in 12 double meridional series, upward of 12 to a series; nuchal organ very small, at anterior end of dorsal double series. Length of type, fully relaxed, 500 mm.; diameter, 8–10 mm.; introvert about 90 mm.; distance from head to nephridiopores, 130 mm.; to anus 140 mm.; to attachment of ventral retractors 215 mm.; to end of intestinal spiral 435 mm. (unusually extended for preserved specimen).

Description.—The skin of preserved specimens is pale yellow or muddy brown. Except on the introvert it is closely beset with small, inconspicuous, roundish glands, on the order of 6 to 8 to each oblong triangle into which the skin is divided. These glands are sunken in the skin (which is smooth to touch) and are surrounded by the peripheral portion of the subdermal coelomic pockets. Coelomic fluid enters these irregular spaces by way of the narrow intervals between the circular muscle bands. Stain forced into them indicates that the space just under the epidermis is independent for each rectangle. The annular and longitudinal grooves outlining the rectangles vary in depth with the inflation of the skin. The posterior end of specimens is likely to be very attenuate and pointed and the annuli conspicuous.

The introvert is not especially well marked externally, except by the absence of the glands, and is the long portion characterized internally by the sieve-like structure of longitudinal muscle layer. There are no hooks.

None of the large specimens has the tentacle crown well enough expanded for a figure, and so it has been necessary to resort to a drawing of a small living specimen (length 70 mm.). The crown, while reminiscent of *Phascolosoma gouldii*, differs in having the tentacles of all the double rows, especially the dorsal, *close together*, with the result that the nuchal organ is almost rudimentary. There are 12 of these double rows separated by 12 grooves: A dorsal double row (not more widely separated than the rest) reaching nearest to mouth; opposite it is a midventral; on each side, five laterals. Counting clockwise from the dorsal, double rows 2, 4, 6, 8, 10, and 12

do not reach quite so near the mouth as the alternates. The mid-dorsal has seven tentacles in each series in this small specimen, the others one or two less as a rule. In large specimens the tentacles are relatively about twice as long and 10 to 12 in each series. Large specimens would therefore have about 120 tentacles altogether. In the small specimen the inner end of the dorsal group of tentacles overlies the brain, which is visible through the skin. The *very small* nuchal organ is at the inner end of this dorsal group, well hidden by the first and second tentacles, and hence is close to the brain.

The inner longitudinal muscle layer is divided into 21 to 25 bundles, which anastomose infrequently. At a distance 20 to 25 mm. in front of the anus the regular bundles cease and anastomose every few millimeters, so that this layer from here to the head appears sievelike by reason of very numerous elongate pores. The intervals between the *regular* longitudinal muscles are crossed by the circular muscle bundles (which, however, unite again under the longitudinal bands). The openings between the circular fascicles give entrance to the transverse lacunae, which in turn feed the subcutaneous spaces that surround the skin glands. The circular muscles are essentially as in *S. multicinctus*, but the annular constrictions are not so uniform and do not indent the ring muscles regularly in the middle. A constriction may divide the muscle into two unequal parts. In the posterior third of the body the longitudinal muscle bundles change from flat ribbons to ridges, which are narrower than the intervals between. The circular muscle bundles are here seen to best advantage. The transverse slits between them are virtually very numerous pockets directly beneath the thin skin to which the coelomic fluid and contents have access.

Posterior attachment of the ventral retractors is two or three muscle bundles from nerve cord; that of dorsals is well in advance of the ventrals and separated from nerve cord by usually seven bundles. Anteriorly the four retractors are in close contact forming a muscular trough in which lies the esophagus. The lateral mesenteries of esophagus are apparent for only a short distance posteriorly.

The nephridia are slender, free, brown in color, and open about four muscle bands laterally from the nerve and a short distance (varying with contraction of longitudinal muscles) in front of the anus. In one specimen they are full of eggs. In front of the simple nephrostome, and also sometimes for a short distance back of it, is an area occupied by papilliform outgrowths of the epithelium. They are either simple or branched (pl. 14, figs. 4, 5), and no opening in them is visible or likely, as they are sometimes turgid with fluid.

In the relaxed type specimen the esophagus is very long, slender, and anteriorly marked by the contractile vessel. The lateral mesen-

teries are inconspicuous, and their posterior border has a muscular strand continued upon the sides of the esophagus. The contractile vessel is posteriorly densely papillated, and its posterior end is considerably behind the point where the esophagus becomes attached to the rectum. Just back of this point the esophagus has a special muscular frenulum (*F*), which is anchored by a fork spanning the nerve cord well in front of the attachment of ventral retractors. In *S. multicinctus* this frenulum anchors the rectum. The intestinal spiral is very long and sometimes reaches nearly to end of body. There are 60 to 62 spirals of the canal counted consecutively.

Plate 14, figure 3, and plate 15, figure 3, show the relations of esophagus, rectum, and spindle muscle in the type and paratype. The spindle muscle arises in front of the anus, and after passing backward through the intestinal spiral (which in the type extends to within 65 mm. of the end of body) it sends off numerous branches, which are attached to the longitudinal bands ventrally, laterally, and dorsally, while a small strand continues to the posterior extremity. Where the esophagus joins the rectum there are two symmetrical lateral branches (*F'*) attached in front of the dorsal retractors to the first muscle bundle external to that from which the dorsal retractors arise. There is no coecum. The wing muscles are fairly conspicuous—rather better developed than in *S. multicinctus*.

At the extreme posterior end of body are four (or five) slender, terete, fusiform bodies, which open close together (around the end of spindle muscle) each on a slight pustule of the skin. They somewhat resemble a cluster of nematodes.

The brain measures about 1 mm. in length and is bilobed. It varies somewhat in appearance in different specimens by reason of being partly obscured by muscle fibers.

Type.—U.S.N.M. No. 20910.

Type locality.—Morro Bay, San Luis Obispo County, Calif., 8 specimens. G. E. MacGinitie collector, January 31 and July 18, 1931, and July 19, 1933.

Specimens examined.—Newport Bay, Orange County, Calif., 7 specimens, among *Zostera*, G. E. MacGinitie, January–February 1930 and February 14, 1932 (with eggs). Elkhorn Slough, off Monterey Bay, Calif., 1 specimen, sandy mud, low tide, G. E. MacGinitie.

Remarks.—This species and *S. multicinctus* are so different in most of the details of internal anatomy that one may question their close relationship. The muscles of the body wall and the subdermal canal system, fed by transverse lacunae in the circular layer, are essentially the same in the two species. It is curious that the muscular anchor *F* (pl. 13, fig. 1; pl. 14, fig. 3) is so similar in the two species.

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EXPLANATION OF PLATES

Plate 8

Thalassema philostracum, new species

1, A seta, 2.75 mm. long, × 20, and its hook further enlarged.

2, Dissection of anterior region of type, × 15. The fore-gut has been pulled to the right to display underlying structures. In the natural position the gizzard is on the left and ventral. Most of the radiating seta muscles have been omitted along with the mesenteries except the ventral (*VM*), which is double.

3, Sketches of four specimens to show variation in body and proboscis length due to accidents of fixation.

B^1, dorsal blood vessel; B^2, ring vessel; B^3, neurointestinal connective; B^4, ventral vessel; *C*, stomach; *CG*, ciliated groove; *G*, gizzard; *MI*, interbasal muscle; *N*, nephridia; *NC*, nerve cord; *O*, esophagus; *P*, pharynx; *Pr*, proboscis; *S*, seta; *Si1*, beginning of siphon; *VM*, ventral mesentery of pharynx.

Plate 9

Thalassema hartmani, new species: Type

1, Portion of alimentary canal to show extent of intestine (dotted) anterior to beginning of siphon, × 2. *AV*, anal vesicle; CG^1, beginning of ciliated groove.

2, Dissection of anterior end to show relations of organs. The fore-gut has been drawn to the right of natural position; × 10. *M*, M^1, mesenteries.

3, A seta, × 10, and its hook enlarged.

4, Small portion of skin, × 20 to show the papillae bent toward anterior end.

5, Ventral aspect of whole animal, × 2, with only a few papillae indicated. The dotted line indicates nerve cord visible through body wall.

Other lettering as for plate 8.

Plate 10

Sipunculus polymyotus, new species

1, Anterior region of type, introvert retracted, opened a little to left of middorsal line and spread out, so that the dorsal retractors are unnaturally divaricate and the rectum is on extreme right instead of being in middorsal line. The intestinal coil is to the right of its natural position; right nephridium omitted. Natural size.

2, Brain and cerebral body (*Fr*), × 5.

3, Left side of head region, showing the left paraneural muscle and its extensions, × 1. The left ventral retractor has a section clipped out; the nerve cord is dotted; longitudinal muscle bundles indicated on the left.

C, Intestinal coecum; *CG*, ciliated groove, which, to avoid confusion, has not been indicated on the intestine; *CV*, dorsal contractile vessel of esophagus; *Fr*, cerebral organ or frons; *I*, introvert; *N*, left nephridium (right omitted). *NC*, nerve cord; *O*, esophagus; *O'*, end of esophagus; *R*, rectum, extending to *C;* the feathered arrows indicate ascending spiral of intestine; *RD*, dorsal retractor; *RV*, ventral retractor; *W*, fan muscle of rectum; *X*, anterior bend of the forward loop of intestine; *Y*, the beginning of anterior loop, indicated by featherless arrows; *Z*, the so-called anal glands.

Plate 11

Sipunculus galapagensis, new species

1, Anterior half of type, natural size, opened a little to left of middorsal line and spread out; longitudinal muscle bundles and right nephridium omitted.
2, Proximal end of left nephridium and adjacent muscle bundles, numbered, × 5.
3, Cerebral body or frons × 10.
4, Tentacle crown, × 3.
5, Marginal elements, enlarged.

C, Coecum; *N*, left nephridium; *NC*, nerve cord; *O*, esophagus, *1* to *6* indicating position of dorsal frenula; *R*, rectum with fixing muscle on either side; *RD*, dorsal retractor, *RV*, ventral retractor; *X*, anterior bend of forward loop of intestine; *Y*, where the intestine turns to form the forward loop; *Z*, rudiments of anal glands.

Plate 12

Xenosiphon branchiatum (Fischer)

1, Anterior sixth of a specimen, with introvert extended, from Panama. It has been opened a little to the left of middorsal line and spread out so that the dorsal retractors are unnaturally spread apart and the rectum is on extreme right instead of being in middorsal line. The esophagus actually bends to left and is attached behind and in a line with the left dorsal retractor; × 2. Figures denote muscle bands to right and left of nerve cord.
2, Sketch of another specimen from Panama, in which the introvert is partly withdrawn, to show altered position of protractors (*P*), natural size.
3, Brain and the bushy frons (cerebral organ), × 10.
4, Six dermal rectangles at margin of papularium of La Paz specimen, × 10. In this specimen the cuticular welts above the canals alone show well, the detail in upper left rectangle being supplied from a Panama specimen. The next rectangle has no papillae but the irregular canal shows through the cuticle. The lower left shows at each end of canal the pores (arrows) which lead eventually to coelom.
5, A single rectangle of skin of Panama specimen about 25 mm. anterior to papularium showing a skin canal gorged with material, × 20. At either end, the dark spot marks the canal to coelom.

A, anus; *C*, intestinal coecum; *CV*, dorsal contractile vessel; *CV'*, ventral contractile vessel; *Fr*, cerebral organ or frons; *I*, introvert; *N*, nephridium; *NC*, nerve cord; *O*, esophagus, its mesenteries cross-hatched; *P*, protractors of head; *R*, rectum; *RD*, dorsal retractor; *RV*, ventral retractor; *S*, spindle muscle; *T*, tentacles; *Z*, filamentous organ described in text.

Plate 13

Siphonomecus multicinctus, new species

1, Region of origin of retractors, the end of esophagus, and rectum to show relations of the two latter to spindle muscle, × 1. The frenulum, *F'*, is a branch of the spindle muscle, *S;* its cut end is attached to body wall dorsally. Esophagus has been severed to show ascending spiral around spindle muscle.

2, Dissection of anterior portion of body, × 4/5. The posterior boundary of introvert is at *I;* frenulum *F* has been omitted; +, on constricted posterior region indicates end of intestinal spiral when in the body naturally.

3, 4, Introvert spines: 3, Curved spine from posterior part of area, × 50; 4, nearly straight spine from first three rows, 0.32 mm. long, × 100.

5, Diagram of tentacles showing the grooves, which are bordered by 5 to 7 grooved pinnae (not indicated), × 2½.

6, Longitudinal section of body wall from posteror region, × 5. The longitudinal muscle band below is not a section but a side view of the bundle.

A, anus; *C*, intestinal coecum; *CC*, circular coelomic canal with arrows in the entrance from body coelom; *CV*, dorsal contractile vessel (there is no ventral); *I*, posterior boundary of introvert; *F*, *F′*, frenula; *LC*, longitudinal canals; *N*, nephridium; *NC*, nerve cord; *NO*, nuchal organ; *O*, the dorsal, and *O′*, the ventral side of esophagus; *R*, rectum, *RV*, retractor muscles; *S*, spindle muscle; *W*, small fan muscles of rectum.

PLATE 14

Siphonomecus ingens, new species

1, Head of a small specimen (Elkhorn Slough, Monterey Bay, Calif.) drawn from life, × 8.

2, Anterior end of paratype, × 1, showing the introvert partly invaginated and retractors in contracted state.

3, Portion of 2 enlarged × 2d. The left dorsal frenulum *F′* has been severed.

4, Nephrostome of a specimen from Newport Bay and associated coelomic papillae, × 10.

5, Coelomic papilla, × 30.

6, Brain of paratype, × 10.

CP, coelomic papillae; *CV*, dorsal contractile vessel; *F*, frenula or fixing muscles; *F′*, left dorsal frenulum; *F″*, right dorsal frenulum; *I*, introvert; *N*, nephridium; *NC*, nerve cord; *NO*, position of nuchal organ at anterior end of dorsal double series of tentacular lappets; *O*, esophagus; *RD*, dorsal retractors; *RV*, ventral retractors; *S*, spindle muscle; *W*, fan muscle of rectum.

PLATE 15

Siphonomecus ingens, new species: Type

1, 2, Anterior half of body × 1.5. The top of fig. 2 is a continuation of the bottom of fig. 1. This specimen is unusually well relaxed. The coelomic papillae have been omitted and the muscle bands are only lightly indicated in order to avoid confusion of lines.

3, Same specimens, × 3. Point where the esophagus joins and is fastened to the ascending intestine at end of rectum, showing relations to spindle muscle (*S*) and dorsal frenula *F′* and *F″*, the ventral frenulum to esophagus is omitted.

4, Segment of the esophagus and four retractors opposite the fan muscles of rectum to show the lateral mesenteries of esophagus, × 5. *M*, right mesentery.

Other lettering as for plate 12.

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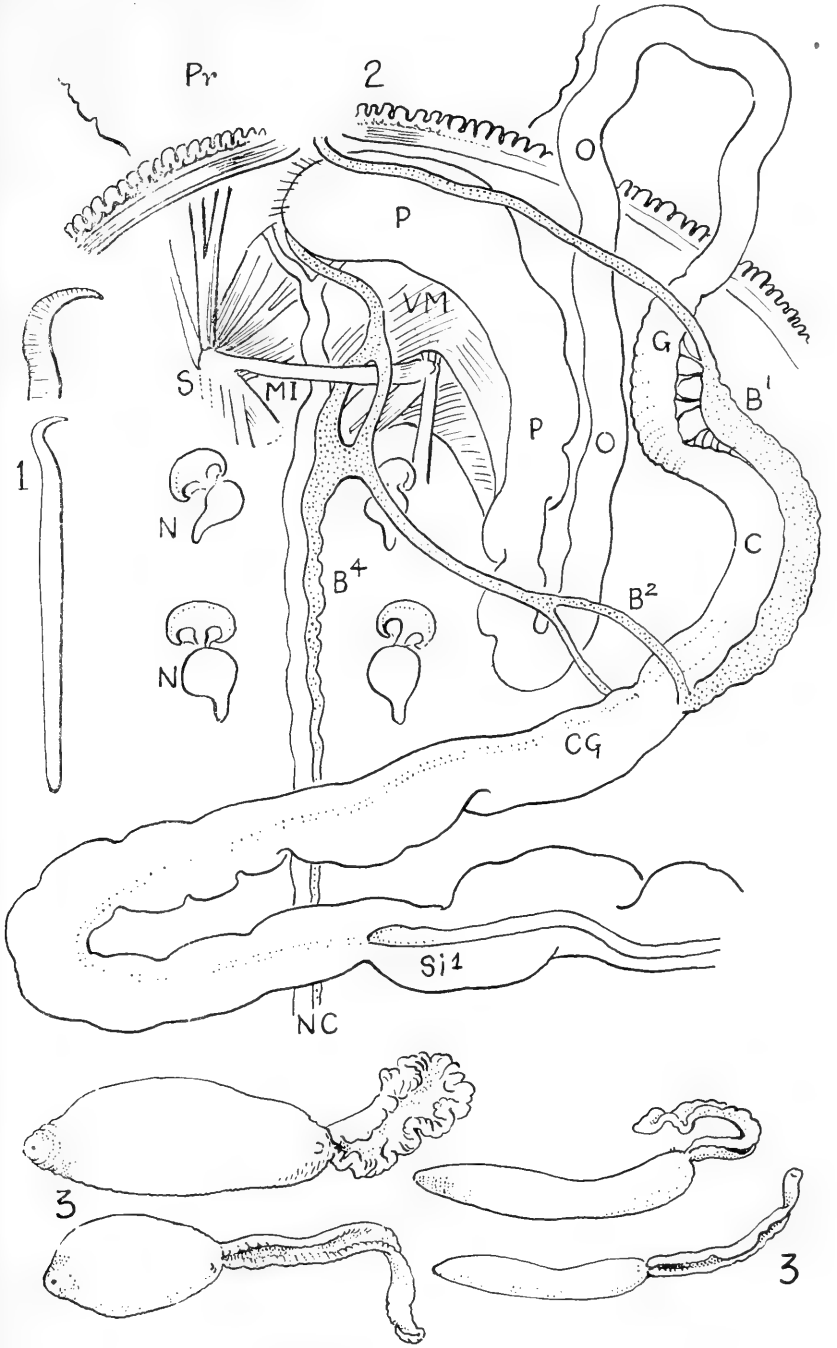
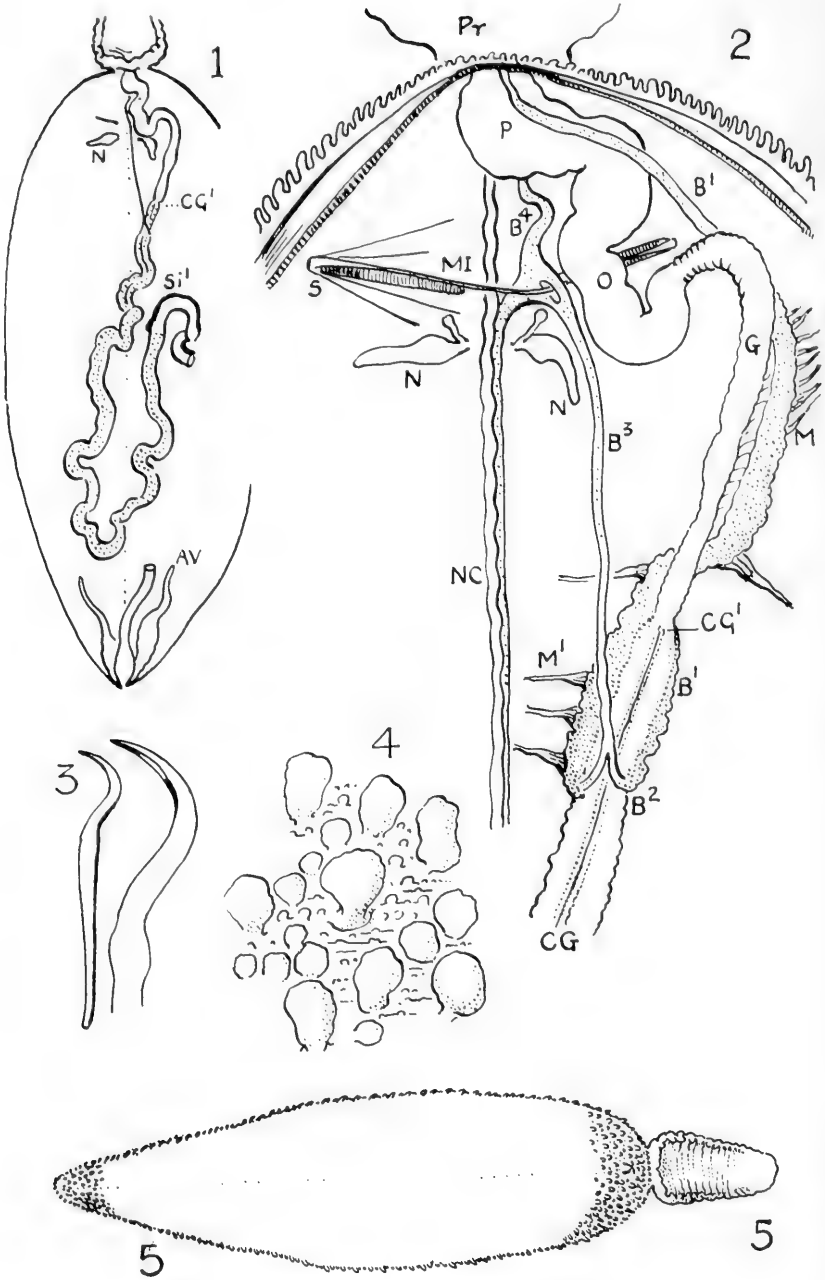


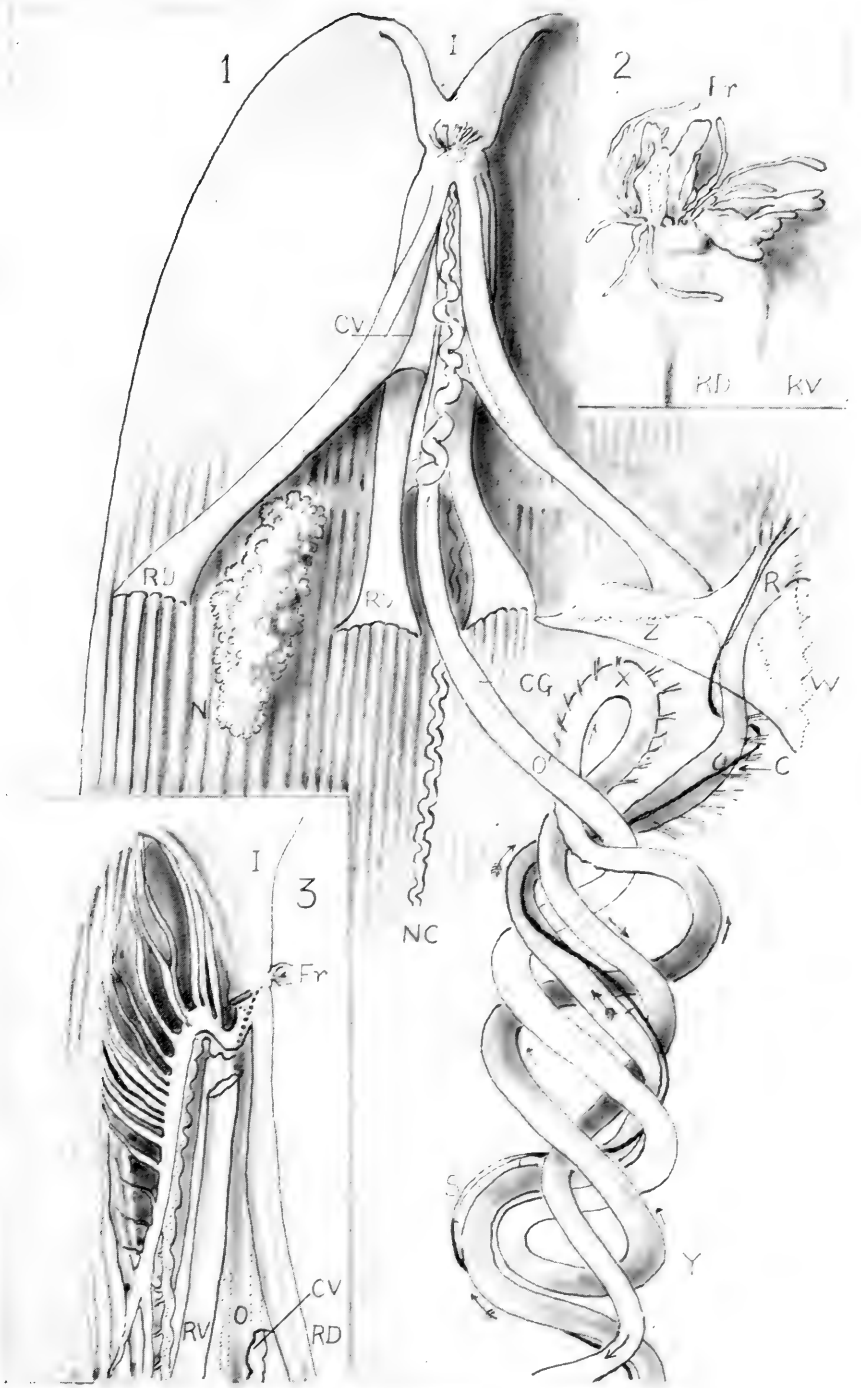
THALASSEMA PHILOSTRACUM, NEW SPECIES.

FOR EXPLANATION, SEE PAGE 370.



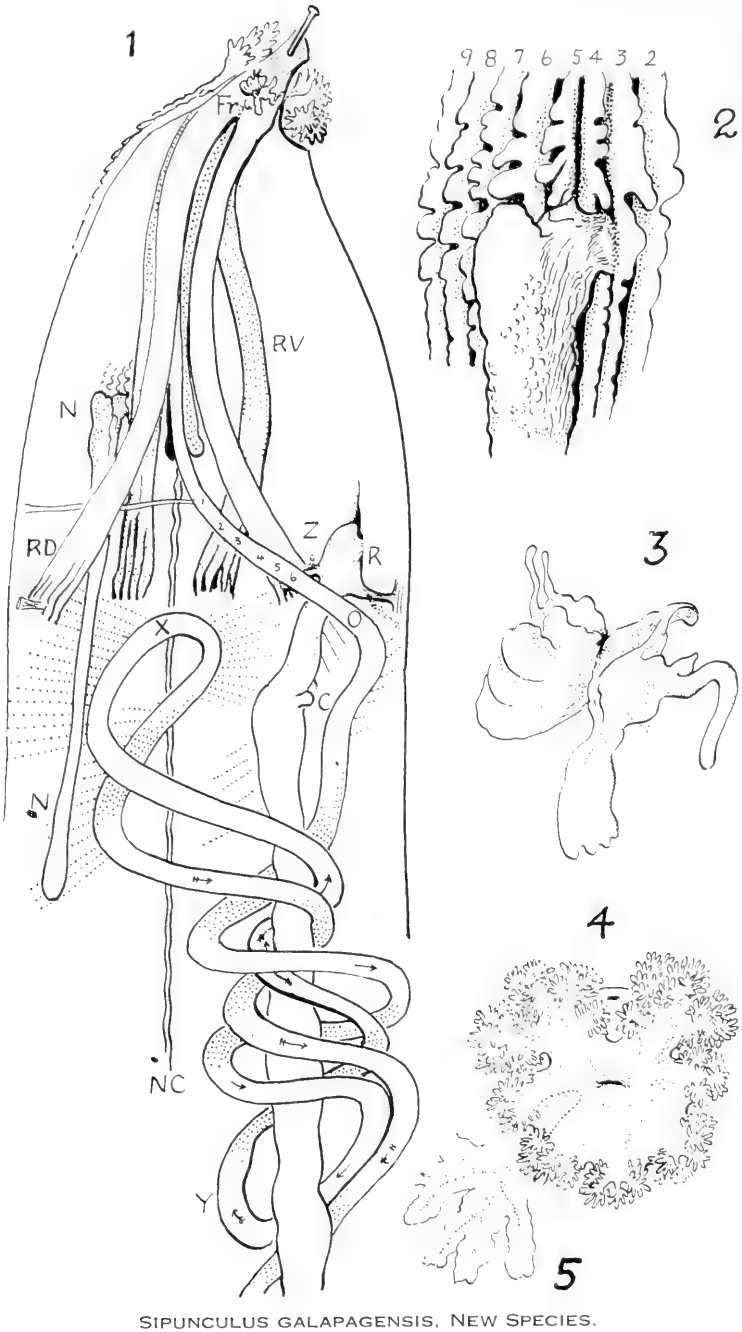
THALASSEMA HARTMANI, NEW SPECIES.

FOR EXPLANATION, SEE PAGE 370.



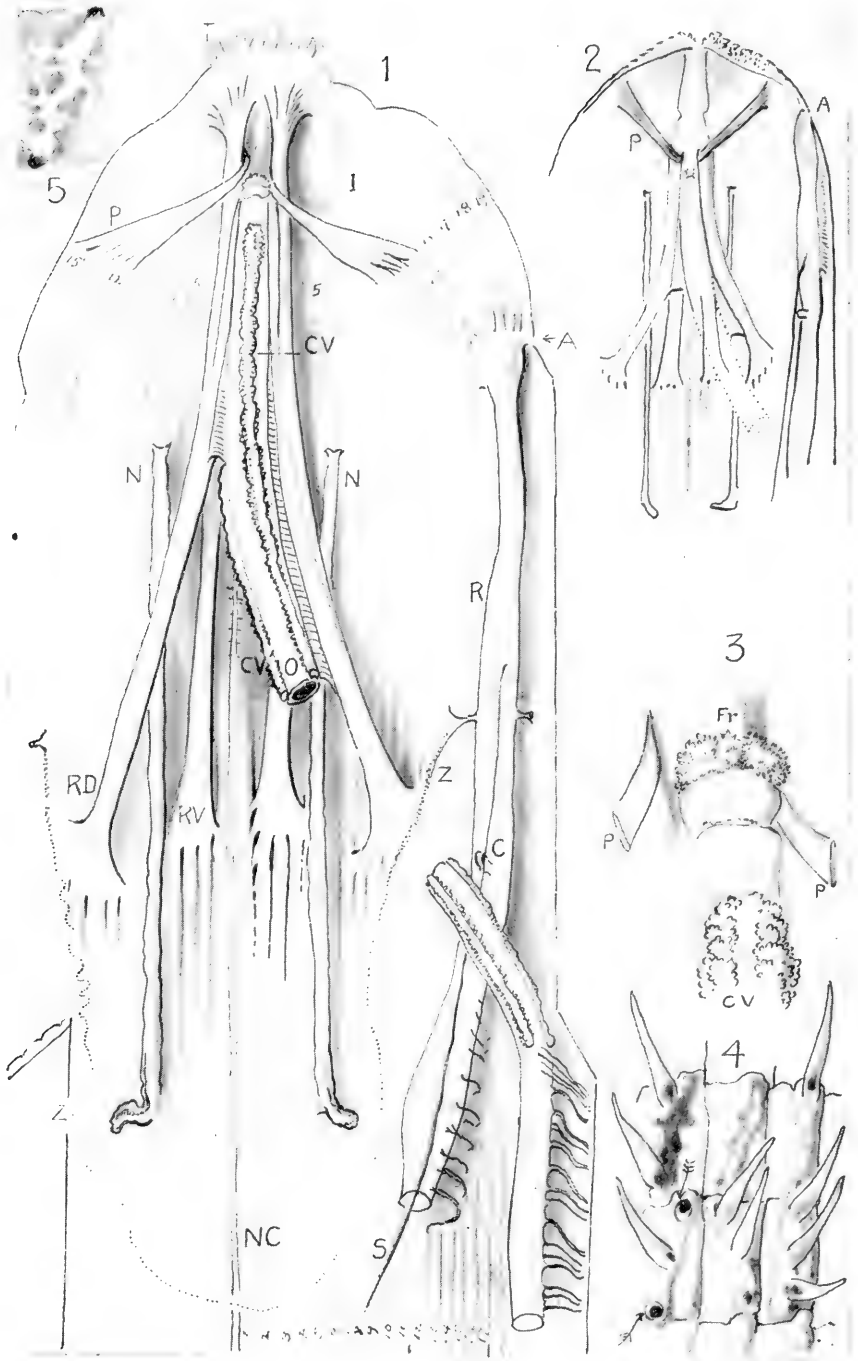
SIPUNCULUS POLYMYOTUS, NEW SPECIES.

FOR EXPLANATION, SEE PAGE 370.



SIPUNCULUS GALAPAGENSIS, NEW SPECIES.

FOR EXPLANATION, SEE PAGE 371.

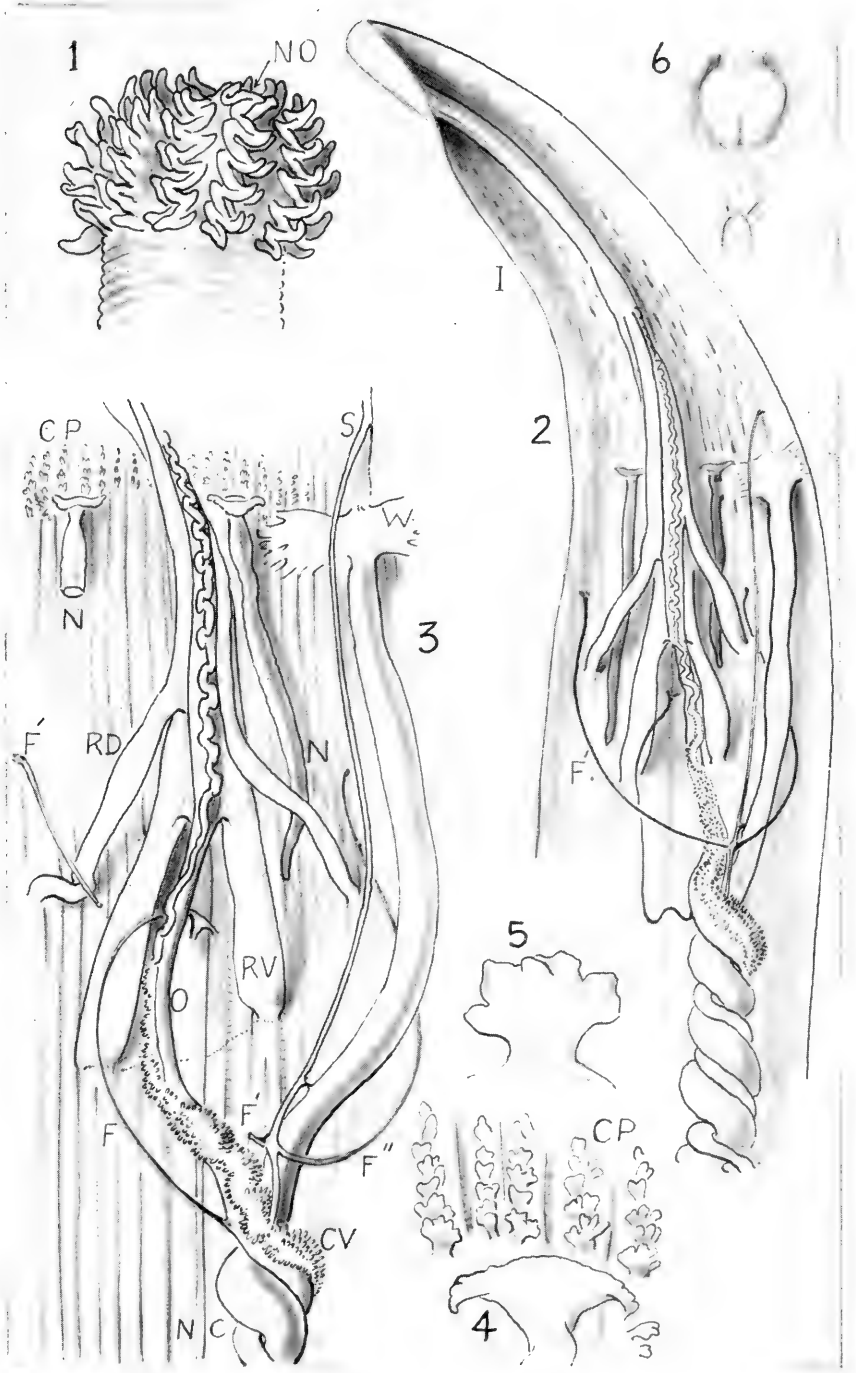


XENOSIPHON BRANCHIATUM (FISCHER)

FOR EXPLANATION, SEE PAGE 371.

SIPHONOMECUS MULTICINCTUS, NEW SPECIES.

FOR EXPLANATION, SEE PAGES 371–372.



SIPHONOMECUS INGENS, NEW SPECIES.

FOR EXPLANATION, SEE PAGE 372.

SIPHONOMECUS INGENS, NEW SPECIES.

FOR EXPLANATION, SEE PAGE 372.

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BIRDS COLLECTED BY THE NATIONAL GEOGRAPHIC SOCIETY'S EXPEDITIONS TO NORTHERN BRAZIL AND SOUTHERN VENEZUELA

By Herbert Friedmann

The collection of birds described in the present report was made by Ernest G. Holt and his assistants on two expeditions under the auspices of the National Geographic Society in connection with the field work of the Venezuelan-Brazilian Boundary Commission. This Commission resulted from the decision of the Brazilian and Venezuelan Governments to mark and accurately map their common boundary, which, "according to treaty, follows the watershed of a rugged chain of mountains that extends from British Guiana more than 900 miles southwestward to the banks of the Upper Rio Negro. Because this remote region was not only geographically unexplored, but was totally unknown zoölogically, the National Geographic Society had obtained special permission of the governments concerned to attach a party of naturalists to the official commissions appointed to carry out the boundary demarcation." (Holt, Nat. Geogr. Mag., vol. 64, Nov. 1933, p. 585.)

On the first of the two expeditions, Mr. and Mrs. Holt traveled as guests of the Comisión Venezolana de Límites, and ascended the Orinoco from Ciudad Bolívar to Puerto Ayacucho, just below the impassable rapids of Atures, where the river journey was interrupted by an overland portage of 42 miles. The Orinoco was reached again above the Maipures Rapids and was followed to Tamatama, where the Casiquiare branches off to the south. Then the route of the expedition followed that stream to its junction with the Rio Negro,

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thence down the Rio Negro to Cucuhy. From there the expedition retraced its steps, making few stops on the way back to Ciudad Bolívar.

On this first trip relatively few birds were collected—some 288 skins as compared with about 3,000 on the second trip. The whole trip was considerably shorter and more time was spent in traveling without opportunity for collecting than on the second journey. The collecting stations and dates for the first trip, starting on the Orinoco and going to the Amazon, are as follows:

November 25–27, December 8, 12, 20, 1929. Venezuela, Ciudad Bolívar.
November 29–31, December 4, 7, 10, 11, 1929. Venezuela, Soledad.
December 1, 1929. Venezuela, Isla Orocopiche, near Soledad.
December 8, 1929. Venezuela, Laguna Icacal, near Ciudad Bolívar.
December 31, 1929–January 10, 1930. Venezuela, Puerto Ayacucho.
January 10, 1930. Venezuela, near Río Sanariapo, near Puerto Ayacucho.
January 12, 1930. Venezuela, Río Orinoco, above Maipures Rapids.
January 30, 1930–February 8, 1930. Brazil, Cucuhy, Rio Negro.

Holt has described some aspects of this journey in an article entitled "In Humboldt's Wake" (Nat. Geogr. Mag., vol. 60, Nov. 1931, pp. 621–644).

On the second journey the route was reversed, the party starting on the Amazon and proceeding up the Rio Negro, with detours to explore some of its tributaries such as the Rio Cauabury and the Rio Maturacá, thence up the Brazo Casiquiare to the upper waters of the Orinoco. This great river was then descended all the way to Ciudad Bolívar, where the collecting came to an end. Where the first, Orinoco-to-Amazon, journey lasted not quite 3 months, the second, Amazon-to-Orinoco, occupied more than three times that time. Furthermore, on the second journey Holt was accompanied by two assistant collectors, Emmet Reid Blake and Charles T. Agostini; and the collection of birds amassed by this industrious trio totaled about 3,000 specimens.

The exact collecting itinerary, as evidenced by the dates on the labels of the specimens, is as follows:

BRAZIL

1930	
Sept. 18	Fazenda Marinha, São Joaquim, Rio Amazonas, Pará.
Sept. 20	North bank of Rio Amazonas at Ceo do Arary, above Parintins, Amazonas.
Sept. 26–Oct. 2	Manáos (Flores Tramway), Amazonas.
Oct. 4	Near Muirapinima, Rio Negro, Amazonas.
Oct. 6	Barcellos, Rio Negro, Amazonas.
Oct. 7	Providencia, between Sao João and Florianopolis, Rio Negro, Amazonas.
Oct. 9–17	Santa Isabel, Rio Negro, Amazonas.
Oct. 21–22	Mouth of Rio Cauabury, Rio Negro, Amazonas.

1930

Oct. 24	Cachoeira Caranguejo, Rio Cauabury, Amazonas.
Oct. 25	Sitio Conobany, Rio Cauabury, Amazonas.
Oct. 26–27	Cachoeira Thomaz, Rio Cauabury, Amazonas.
Oct. 28	Below Cachoeira Destacamento, Rio Cauabury, Amazonas.
Oct. 29	Cachoeira Destacamento, Rio Cauabury, Amazonas.
Oct. 30	Cachoeira Manajó, Rio Cauabury, Amazonas.
Oct. 31	Above Cachoeira Manajó, Rio Cauabury, Amazonas.
Nov. 1	Above Cachoeira, Panela de Onca, Rio Cauabury, Amazonas.
Nov. 2	Below second Cachoeira Thomaz, Rio Cauabury, Amazonas.
Nov. 3	Below mouth of Rio Já, Rio Cauabury, Amazonas.
Nov. 4–5	Above mouth of Rio Já, Rio Cauabury, Amazonas.
Nov. 6–7	Below mouth of Rio Maturacá, Rio Cauabury, Amazonas.
Nov. 8	Mouth of Rio Maturacá, Rio Cauabury, Amazonas.
Nov. 9–13	Rio Maturacá, Amazonas.
Nov. 14–26	Salto do Huá, Rio Maturacá, Brazilian-Venezuelan line.
Nov. 26–Dec. 9	Western foothills of Serra Imeri, near Salto do Huá.
Dec. 11	Rio Maturacá, below Salto do Huá.
Dec. 14	Cachoeira Destacamento, Rio Cauabury, Amazonas.
Dec. 23	Camanãos, Rio Negro, Amazonas.
Dec. 26–Jan. 19, 1931	São Gabriel, Rio Negro, Amazonas.

VENEZUELA

1931

Jan. 25	Isla Yagrumo, Río Negro, Amazonas.
Jan. 26	Santa Rosa, Río Negro, Amazonas.
Jan. 27	Río Negro Islands below San Carlos, Amazonas.
Jan. 27–28	San Carlos, Río Negro, Amazonas.

COLOMBIA

Jan. 29–30	Bank of Río Negro opposite San Carlos, Venezuela.

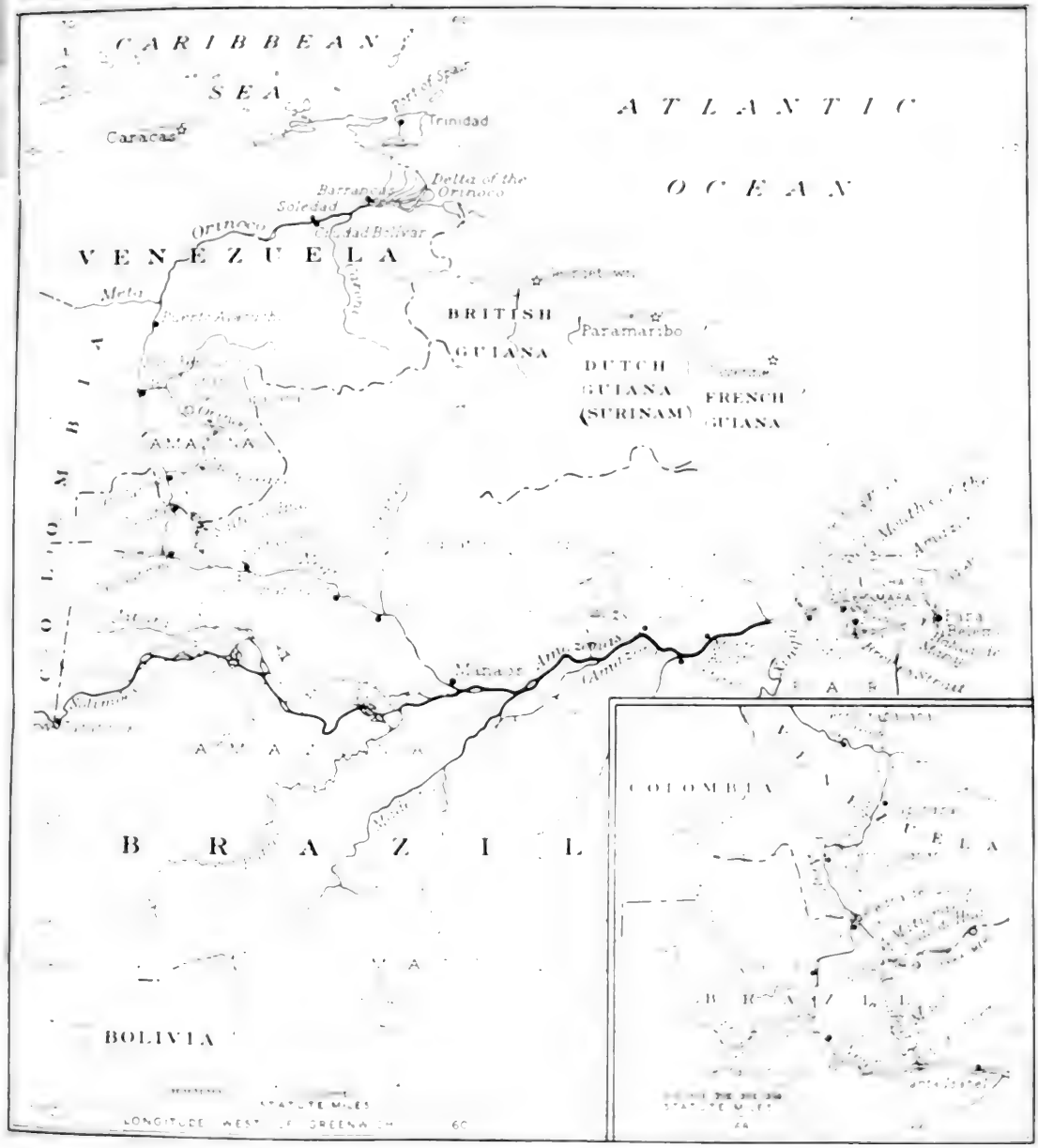
VENEZUELA

Jan. 30–31	Chapazon, right bank of Brazo Casiquiare near its mouth.
Feb. 1–2	Raudal San Sebastián, Brazo Casiquiare.
Feb. 2	Solano, Brazo Casiquiare.
Feb. 4	Cerro Guanari, Brazo Casiquiare.
Feb. 4	Opposite Buena Vista, Brazo Casiquiare.
Feb. 5	El Mango, Brazo Casiquiare.
Feb. 5	Raudal Quirabuena, Brazo Casiquiare.
Feb. 6	Brazo Casiquiare at mouth of Caño Atamoni.
Feb. 7	Curare, Brazo Casiquiare.
Feb. 7	Raudal Corocoro below Playa de Candela, Brazo Casiquiare.
Feb. 8	Playa de Candela, Brazo Casiquiare.
Feb. 9	Raudal Corocoro, below Playa de Candela, Brazo Casiquiare.
Feb. 10	Playa de Candela, Brazo Casiquiare.
Feb. 10–13	Brazo Casiquiare, below mouth of Río Pacila.
Feb. 13	Viudita, Brazo Casiquiare.
Feb. 14	Piedra Pintado, Brazo Casiquiare.
Feb. 16	Capibara, Brazo Casiquiare.
Feb. 17	Near mouth of Caño Berimpomoni, Brazo Casiquiare.
Feb. 18	Caño Matipin, Brazo Casiquiare.
Feb. 18	Caño Perro de Agua, Brazo Casiquiare.
Feb. 19	Caño Durutomoni, Brazo Casiquiare.

1931	
Feb. 19	Caño Pamoni, Brazo Casiquiare.
Feb. 20	Caño Mabinagui, Brazo Casiquiare.
Feb. 21	Buenos Aires, Brazo Casiquiare.
Feb. 22	Brazo Casiquiare, below Caño Caripo.
Feb. 23	Upper Orinoco, Tamatama.
Feb. 24	Upper Orinoco, near Cerro Cariche.
Feb. 25	Upper Orinoco, near Isla Temblador.
Feb. 28–Mar. 9	Upper Orinoco, San Antonio.
Mar. 12–16	Upper Orinoco, right bank opposite Corocoro Island.
Mar. 17–23	Upper Orinoco, base camp, Cerro Yapacana.
Mar. 23–Apr. 29	Upper Orinoco, Cerro Yapacana.
May 8–23	Río Orinoco, Puerto Ayacucho.
June 8–11	Río Orinoco, Ciudad Bolívar.
June 11–12	Río Orinoco, Soledad, Anzoátegui.

Just as Holt has written a descriptive account of the first trip, he also published a similar paper on the second, under the title "A Journey by Jungle Rivers to the Home of the Cock-of-the-Rock" (Nat. Geogr. Mag., vol. 64, Nov. 1933, pp. 585–630). To these two articles the interested reader is referred for descriptions of parts of the areas traversed. For the present report the map and the photographs, kindly furnished by the National Geographic Society, will serve in lieu of description.

Aside from adding to our knowledge of the variations, plumages, and distribution of many of the nearly 500 kinds of birds collected, the present material has been studied in the hope that it might throw some light on the general problem of the variational and distributional behavior of species and subspecies at the meeting place of two faunal areas, the Amazonian and the Orinocoan. As the study progressed and species after species was examined it became apparent that there is no marked distinction between the bird life of the Upper Amazon and the Rio Negro on the one hand and that of the Casiquiare and Upper Orinoco on the other. The two river systems are apparently so much older than the birds that dwell in their drainage basins and the watershed between them became practically nonexistent at such an early time geologically that the distribution of the bird species today reflects nothing of what may have been an originally quite different topographic picture. The statement that the watershed between them became nonexistent is intended to apply primarily to the routes of the main streams—the Upper Orinoco and the Upper Rio Negro, which are, in fact, connected by the Casiquiare, a true canallike stream which drains Orinoco water southward into the Amazonian system. There is still something of a real watershed along the more eastern part of the Brazilian-Venezuelan and the Brazilian-Guianan borders. The great age of the present uninterrupted terrain of low forested country from the Upper Rio


CARIBBEAN SEA
ATLANTIC OCEAN
Caracas
Port of Spain
Trinidad
Barrancas
Soledad
Delta of the Orinoco
Orinoco
Ciudad Bolivar
VENEZUELA
Meta
Puerto Ayacucho
BRITISH GUIANA
Paramaribo
DUTCH GUIANA (SURINAM)
FRENCH GUIANA
COLOMBIA
AMAZONAS
Manaos
Amazonas
Solimões
BRAZIL
BOLIVIA
STATUTE MILES
LONGITUDE WEST OF GREENWICH
60°
COLOMBIA
BRAZIL
STATUTE MILES
44

Negro to the Upper Orinoco is apparently the most important basic factor behind the present distributional picture of the local avifauna. It should not be assumed that there are no differences in the bird life of the Upper Rio Negro and of the Upper Orinoco, but the number of forms that break up into different races in the two areas is small indeed compared to the great number that do not. Many more species divide into races well down the Orinoco, but not between the Negro, the Casiquiare, and the Upper Orinoco. Among the species that do have separate subspecific groups in the two areas are the following:

Sakesphorus canadensis:	
S. c. loretoyacuensis	Rio Negro.
S. c. fumosus	Casiquiare, Upper Orinoco.
Grallaria macularia:	
G. m. paraensis	Rio Negro.
G. m. diversa	Casiquiare, Upper Orinoco.
Sublegatus glaber:	
S. g. sordidus	Rio Negro.
S. g. orinocensis	Casiquiare, Upper Orinoco.
Phaeomyias murina:	
P. m. wagae	Rio Negro.
P. m. incomta	Casiquiare, Upper Orinoco.
Camptostoma obsoletum:	
C. o. napaeum	Rio Negro.
C. o. venezuelae	Upper Orinoco.
Manacus manacus:	
M. m. interior	Rio Negro.
M. m. umbrosus	Upper Orinoco.

The surprisingly few birds that range north to the Upper Rio Negro but not to the Casiquiare and the Upper Orinoco, birds like *Myiozetetes luteiventris* and *Todirostrum maculatum annectens*, may yet be found in the latter area, as the total bulk of collections made there is still not great. For this reason, it is well not to attempt to read any significance into these few instances.

Of the 486 species and subspecies of birds in the collections here reported on, the following 10 were found to be new to science and have been described elsewhere:

Brotogeris chrysopterus tenuifrons Friedmann
Nyctiprogne leucopyga exigua Friedmann
Nyctiprogne latifascia Friedmann
Reinarda squamata semota Riley
Capito auratus transilens Friedmann
Formicivora grisea rufiventris Carriker
Myrmeciza disjuncta Friedmann
Manacus manacus umbrosus Friedmann
Ateleodacnis margaritae Holt
Thlypopsis sordida orinocensis Friedmann

In addition to these novelties, 11 forms seem to be additions to the published records of birds for Venezuela, and 5 appear to be new to Brazil. The apparent additions to the Venezuelan avifauna are as follows:

Micrastur semitorquatus semitorquatus
Ara severa castaneifrons
Ciccaba huhula (previously published on the basis of the same specimen)
Chordeiles rupestris
Chaetura spinicauda aethalea
Psilomycter theresiae leucorrhous
Trogon violaceus ramonianus
Galbula albirostris chalcocephala
Coryphotriccus parvus parvus
Attila citriniventris
Pseudattila phoenicurus

The five birds added to the recorded Brazilian ornis are:

Hydropsalis climacocerca schomburgki
Aeronautes montivagus tatei
Heliodoxa xanthogonys
Terenura spodioptila spodioptila
Leptopogon superciliaris venezuelensis

In addition to these, the present collection serves to extend, or to fill gaps in, the previously known ranges of some 30 or more other birds among which may be mentioned:

Tinamus major zuliensis
Crypturellus noctivagus duidae
Accipiter pectoralis
Leucopternis melanops
Porzana flaviventer flaviventer
Thalurania furcata nigrofasciata
Jacamerops aurea ridgwayi
Myrmotherula ambigua
Myrmotherula cherriei
Myrmotherula guttata
Gymnopithys rufigula rufigula
Xiphorhynchus pardalotus
Xenops tenuirostris acutirostris
Microxenops milleri
Todirostrum pictum
Colopteryx galeatus
Elaenia ruficeps
Perissocephalus tricolor
Xenopipo atronitens
Schiffornis major duidae
Microcerculus bambla caurensis
Turdus ignobilis arthuri
Hylophilus muscicapinus muscicapinus
Piranga flava haemalea
Tachyphonus phoeniceus
Caryothraustes canadensis canadensis
Pitylus grossus grossus

In working out the various problems raised by the different species in the collection, I have been fortunate in the loan of pertinent material from the American Museum of Natural History, the Museum of Comparative Zoology, the Carnegie Museum, and the Academy of Natural Sciences of Philadelphia. I am especially indebted to Dr. John T. Zimmer for aid in identifying a few obscure plumages and for his opinion on a number of other items. Some time before I began to study this collection, Dr. Alexander Wetmore made a number of identifications in connection with other studies he was pursuing; these he has generously placed at my disposal. In some instances he had examined long series in other museums, and his comments, which have been retained in the present paper, are appreciated accordingly. A number of years ago M. A. Carriker, Jr., worked over the Tyrannidae in the collection, but subsequently published papers on these difficult birds have made it necessary to go over them anew. After this report had been completed a few of the forms involved were reexamined together with W. H. Phelps, whose comments have been used to modify earlier wordings.

The National Museum is indebted to the National Geographic Society for the present splendid collection, which has greatly enriched

its series of Neotropical birds and which is of particular value as it comes from a region at once so interesting and hitherto so poorly represented in museum collections.

The photographs for the illustrations are reproduced by courtesy of the National Geographic Society. All were taken by Mr. Holt, and all are copyrighted by the Society.

Family TINAMIDAE: Tinamous

TINAMUS MAJOR ZULIENSIS Osgood and Conover: ***Zulia Tinamou***

Tinamus major zuliensis Osgood and Conover, Publ. Field Mus. Nat. Hist., Zool. Ser., vol. 12, 1922, p. 24 (Río Cogollo, Perijá, State of Zulia, Venezuela).

SPECIMENS COLLECTED

5 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 4–25, 1931.

Most of the specimens were noted by the collectors as having enlarged gonads when shot.

These skins have either no noticeable crests or very short ones. Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, p. 17, footnote) write of their material that "while most of the birds united here under *zuliensis* have no crest or but a short one, one from the foot of Mount Duida has the occipital feathers fully as long as in *T. m. major*." The same authors note also that birds from the Caura and the Orinoco average more brownish than more western (more topotypical) specimens, but that they vary considerably, "and two from the Rio Ocamo are very nearly as yellowish olive as the type of *zuliensis*."

This series shows very clearly that *zuliensis* is dichromatic; two of the birds (one of each sex) are considerably more rufescent above than the other five olive-brown ones. There is also great variation in the darkness or paleness of the underparts; in one extreme the ground color of the breast, all but the lower middle abdomen, sides, and flanks, is a dusky buffy, and the vermiculations are strong and dark; in the other extreme (of the same sex and color phase) the ground color is almost whitish except for the breast, which is more washed with pale buffy, but the vermiculations are finer and paler, giving a very light appearance to the ventral surface of the bird.

The Zulia tinamou occurs from the Santa Marta area of Colombia and most of Venezuela south to the Upper Orinoco (Cerro Yapacana, Mount Duida) and east to the Caura River. In other words, the present series is from the extreme southern limit of the range of the race.

TINAMUS MAJOR SERRATUS Spix: ***Rio Negro Tinamou***

Tinamus serratus Spix, Avium species novae . . . Brasiliam . . . , vol. 2, 1825, p. 61, pl. 76 ("in sylvis campestribus fl. Nigri"=Rio Negro, Brazil).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, above Cachoeira, Panela de Onca, November 1, 1930.

The Rio Negro tinamou differs from the Zulia race in having the upperparts somewhat darker, more brownish, less olivaceous, and on the average less heavily barred, the top of the head slightly duller, less brightly rufescent, but with the rufescent tone extending downward more on the cheeks and auriculars, and, even in pale-bellied individuals, with the ventral ground color more buffy, less whitish.

The present example is one of the northernmost records for the subspecies. The known range of this tinamou extends from the Rio Negro south to the north bank of the Solimões, and west to the Lower Rio Içа.

TINAMUS GUTTATUS Pelzeln: ***White-throated Tinamou***

Tinamus guttatus (Natterer, MS.) Pelzeln, Verh. zool.-bot. Ges. Wien, vol. 13, 1863, pp. 1126, 1128 (Borba, Rio Madeira, Brazil; designated by Hellmayr, Nov. Zool., vol. 14, 1907, p. 409).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 24, 1930.

2 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, December 1–4, 1930.

3 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 28–April 25, 1931.

At first glance it seems that the Brazilian birds might prove to be separable from the Venezuelan ones, as the former are darker, more ochraceous-tawny on the throat and breast than are the latter. However, one of the four Venezuelan birds agrees in this respect with the Brazilian specimens, so for the present, and in the absence of comparative series, especially of topotypical *guttatus*, it seems advisable to keep them all under one name. Furthermore, as indicative of the variability of this character, it may be noted that Hellmayr (Nov. Zool., vol. 14, 1907, p. 409) describes birds from the Rio Madeira as having the underparts "rather pale brownish buff, almost white along the middle of the abdomen . . ." Also, Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, p. 23, footnote) write that birds from the Upper Rio Negro appear to be inseparable from those from south of the Amazon.

The Cerro Yapacana specimens were noted as having enlarged, active gonads when collected.

No Peruvian specimens have been seen; Salvadori (Catalogue of the birds in the collection of the British Museum, pt. 27, 1895, p. 508) noted that birds from Peru have the upperparts with scarcely any blackish bars, and the whitish-buff spots on the wings larger and less numerous than Brazilian ones.

CRYPTURELLUS SOUI SOUI (Hermann): ***Pileated Tinamou***

Tinamus soui Hermann, Tabula affinitatum animalium . . . , 1783, p. 165 (based on "Le Soui" Buffon, Histoire naturelle des oiseaux, vol. 4, p. 512, and Daubenton, Planches enluminées . . ., pl. 829: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Negro, February 8, 1930.
1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 27, 1930.
1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 17, 1931.

The female is larger and more rufescent than the male and has the top of the head darker, more blackish. The young bird has the feathers of the breast and lower throat and sides of the neck tipped with wedge-shaped white marks edged with black on their proximal sides, the feathers of the upper and lateral abdomen with the white tips more elongated less wedge-shaped and with no black edging; the upper wing coverts also have small medioterminal white spots; the greater upper wing coverts and the scapulars are tipped with olive-brown, the basal part of this terminal area being lighter and yellower, proximally broadly bordered with fuscous to fuscous-black.

The pileated tinamou occurs throughout the areas traversed by the collectors.

CRYPTURELLUS VARIEGATUS VARIEGATUS (Gmelin): ***Variegated Tinamou***

Tetrao variegatus Gmelin, Systema naturae, vol. 1, pt. 2, 1789, p. 768 (based on "Le Tinamou varié" Daubenton, Planches enluminées..., pl. 828: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Serra Imeri (western foothills), December 2, 1930.
1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 9, 1931.

The two specimens taken at Cerro Yapacana had the gonads enlarged and in active condition when collected.

The Brazilian specimen is quite different from the other two, and agrees with Todd's description (Proc. Biol. Soc. Washington, vol. 50, 1937, p. 176) of two birds from the Caura River, Venezuela, and one from Obidos, Brazil. "Instead of being black, above, narrowly barred with buffy, they are decidedly rufescent (near Brussels brown), barred and mottled with black; the buffy bars are scarcely obvious, except on the wing-coverts; the upper tail coverts have black bars separated by olive brown interspaces each having a median transverse rufescent buffy line . . . Since we have also a perfectly typical adult (*variegatus*) from Obidos these three odd birds must represent either a color-phase, a stage of plumage not fully mature, or another species altogether. They certainly look different enough to justify the latter alternative, hard as it is to accept . . ." Todd's birds showed traces of immaturity—some whitish spots on the upper wing coverts; the present example shows none, and it therefore decreases the likeli-

hood of its being a "stage of plumage not fully mature." By adding a new locality record for this plumage it seems to increase the possibility of its being a color phase appearing here and there within the range of *variegatus*. As a matter of fact, one of the present Venezuelan birds has the pale dorsal bars much more rufescent than the other one and helps to bridge the difference between the latter and the Serra Imeri skin. The Brazilian bird is more buffy, less whitish on the lower middle abdomen than are the two Venezuelan examples.

CRYPTURELLUS NOCTIVAGUS DUIDAE (Zimmer): ***Duida Tinamou***

Crypturellus noctivagus duidae ZIMMER, Proc. Biol. Soc. Washington, vol. 51, 1938, p. 48 (Mount Duida ("Campamento del Medio"), Venezuela, altitude 350 feet).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 30–April 7, 1931.

These two specimens are the first to be taken away from the type locality, and extend the known range of the tinamou a short distance to the west. The measurements are as follows (adult first): Wing 161, 156; tail 46, 48; culmen from base 32.5; tarsus, 52, 50 mm. Zimmer's measurements of the type, an adult male, agree fairly well except in wing length, the type having a wing 173 mm. long.

The specimen marked immature resembles the adult one but is paler on the back, rump, and upper tail coverts, the black bars not so dark and narrower.

Family ANHINGIDAE: Waterturkeys

ANHINGA ANHINGA ANHINGA (Linnaeus): ***Southern Waterturkey***

Plotus anhinga LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 218 (Brazil; restricted to Rio Tapajóz, Pará, Brazil, by Griscom and Greenway, Bull. Mus. Comp. Zool., vol. 88, 1941, p. 103).

SPECIMEN COLLECTED

1 ♀, Brazil, Salto do Huá, Rio Maturacá, November 20, 1930.

The waterturkeys of South America are considerably larger than the North American form, *A. a. leucogaster*.

Family ARDEIDAE: Herons

BUTORIDES STRIATUS STRIATUS (Linnaeus): ***South American Green Heron***

Ardea striata LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 238 (Surinam).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 17, 1930.

The single specimen obtained is in fresh plumage. Occurs throughout the areas traversed by the expedition.

An alcoholic specimen was made of a bird taken near Durumutoni, Brazo Casiquiare, Venezuela, February 19, 1931.

NYCTICORAX NYCTICORAX HOACTLI (Gmelin): ***Black-crowned Night Heron***

Ardea hoactli GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 630 ("In Novae Hispaniae lacubus"=Valley of Mexico).

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Ciudad Bolívar, June 8, 1931.

The specimen, although labeled "adult" by the collectors, is obviously a young bird in the streaked brown and white plumage.

TIGRISOMA LINEATUM LINEATUM (Boddaert): ***Northern Tiger Bittern***

Ardea lineata BODDAERT, Table des planches enluminéez . . . , 1783, p. 52 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–9, 1931.

This heron occurs throughout the regions collected over by the expedition, but apparently it is not common anywhere. The two examples obtained are in fairly fresh plumage.

Family COCHLEARIIDAE: Boat-billed Herons

COCHLEARIUS COCHLEARIUS COCHLEARIUS (Linnaeus): ***South American Boat-billed Heron***

Cancroma cochlearia LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 233 (Guiana).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

A specimen in fairly worn plumage.

Family CICONIIDAE: Storks, Jabirus

JABIRU MYCTERIA (Lichtenstein): ***Jabiru***

Ciconia mycteria LICHTENSTEIN, Abh. Akad. Wiss. Berlin (Phys. Kl.), 1816–17 (1819), p. 163 (Brazil).

SPECIMEN COLLECTED

1 skull, Ciudad Bolívar, Venezuela, 1931.

This skull was picked up at Ciudad Bolívar and may not even have been of a bird killed at that spot.

Family THRESKIORNITHIDAE: Ibises

MESEMBRINIBIS CAYENNENSIS (Gmelin): ***Cayenne Ibis***

Tantalus cayennensis GMELIN, Systema naturae, vol. 1, 1789, p. 652 (Cayenne).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Rio Cauabury, Cachoeira Destacamento, October 29, 1930.
1 ad. ♂, Brazil, Rio Cauabury, below Cachoeira Thomaz, November 2, 1930.

This ibis ranges from Panama to Chile and Paraguay and to southeastern Brazil.

The immature female has the chin, throat, and breast slightly darker than the adult male. Both birds are in fairly worn plumage.

PHIMOSUS INFUSCATUS BERLEPSCHI Hellmayr: ***Berlepsch's Ibis***

Phimosus berlepschi HELLMAYR, Verh. zool.-bot. Ges. Wien, vol. 53, 1903, p. 247 (Orinoco region).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 4, 1930.

Hellmayr circulated proof sheets containing this species and marked them "Verhandl. Zool.-Bot. Ges. Wien, Heft 3–4–22.5.03," the present name appearing on p. "xvi" of the proof. If this be considered as constituting valid publication the reference given above should be altered accordingly. I am indebted to the late Dr. C. W. Richmond's invaluable card file of bird names for this information.

Unfortunately, there are no notes on the color of the bare parts of the head accompanying our specimen, which is thus, of necessity, identified to subspecies on geographic grounds. The race *berlepschi* is said to have the bare part of the head dark carmine, the bill wood brown with a blackish tip, but the carmine, like the corresponding clay color of the Brazilian race *P. i. nudifrons*, fades out to yellowish in dried skins.

Family ANATIDAE: Ducks, Geese, etc.

DENDROCYGNA AUTUMNALIS DISCOLOR Sclater and Salvin: ***Gray-breasted Tree Duck***

Dendrocygna discolor SCLATER and SALVIN, Nomenclator avium neotropicalium . . ., 1873, p. 161 (Venezuela, Guiana, and Brazil).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 13, 1931.

The bird is in a molting stage; the remiges are only partly grown and are still enclosed in their sheaths basally.

This tree duck occurs in suitable places throughout the Amazonian-Orinocoan regions traversed by the collectors. It is wholly a bird of the tropical lowlands, seldom occurring over 1,000 feet above the sea.

NEOCHEN JUBATA (Spix): ***Orinoco Goose***

Anser jubatus SPIX, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 84, pl. 108 ("Ad ripam fl. Solimoëns in insula Praya das Onças").

SPECIMEN COLLECTED:

1 im. ♀, Venezuela, Estado Bolívar, December 8, 1929.

Although labeled as an immature bird this specimen appears to be an adult. It is in fine, fresh plumage.

The so-called Orinoco "goose" is found throughout the areas involved in the present report. According to Phillips (Natural history of the ducks, vol. 1, 1922, p. 201) it is the commonest duck on the Orinoco; it inhabits wet and densely wooded tropical lowlands.

Family CATHARTIDAE: New World Vultures

CATHARTES URUBITINGA Pelzeln: ***Yellow-headed Vulture***

Cathartes urubitinga "Natterer," PELZELN, Sitzungsb. Akad. Wiss. Wien, vol. 44, 1861, p. 7 (southern and central Brazil).

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 15, 1931.

The yellow-headed vulture occurs from northeastern Venezuela and the Guianas south to northern Argentina and Uruguay. Because of the unpleasantness in handling, it (like many of its congeners) is all too rare in collections and has been studied but little. Not enough specimens are available to attempt a study of its possible variations.

Family ACCIPITRIDAE: Hawks, Harriers, etc.

CHONDROHIERAX UNCINATUS UNCINATUS (Temminck): ***Hook-billed Kite***

Falco uncinatus "Illiger" TEMMINCK, Nouveau recueil de planches coloriées d'oiseaux, livr. 18, 1822, pls. 103, 104, 115, and text ("Vicinity of Rio to the north of Brazil and all of Guiana").

SPECIMEN COLLECTED

1 ad.–, Venezuela, Ciudad Bolívar, June 9, 1931.

The single example obtained of this rather uncommon hawk is preserved in alcohol. It is in the gray-barred type of plumage.

ACCIPITER PECTORALIS (Bonaparte): ***Red-collared Goshawk***

Falco pectoralis BONAPARTE, Rev. et Mag. Zool., 1850, p. 490 (Brazil).

SPECIMEN COLLECTED

1 ad.–, Venezuela, Cerro Yapacana, Upper Orinoco, April 23, 1931.

By plumage and measurements (wing 263, tail 200 mm.) this specimen is apparently an adult male. As has been pointed out by earlier writers this hawk is very similar to, but much smaller than, *Spizaetus ornatus* in appearance. It is a very rare bird and still is known from only a few widely scattered localities and specimens.

This appears to be the second known Venezuelan specimen, the other being a female from Mount Auyán-tepuí, recorded by Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 457).

BUTEO ALBICAUDATUS COLONUS Berlepsch: ***Guiana White-tailed Hawk***

Buteo albicaudatus colonus BERLEPSCH, Journ. für Orn., vol. 40, 1892, p. 91 (Island of Curaçao).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, near Soledad, Anzoátegui, December 1, 1929.

The short wing length of this example, 418 mm., shows that the bird is of the race *colonus* to which it should belong on geographic grounds. It is a fully adult bird in good plumage. Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 458) has recorded *colonus* from as far south as Mount Auyán-tepuí, and lists it from Maripa, about a hundred miles west of Soledad. It gets to Pará (Ilha Marajó) on the Lower Amazon, but Griscom and Greenway find (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 112) that a bird from the Tapajóz is referable to *B. a. albicaudatus*. They write that the two forms meet in lower Amazonia.

BUTEO MAGNIROSTRIS MAGNIROSTRIS (Gmelin): ***Insect Hawk***

Falco magnirostris GMELIN, Systema naturae, vol. 1, pt. 1, 1788, p. 282 (Cayenne).

SPECIMENS COLLECTED:

1 ad. ♂, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, opposite Corocoro Island, March 12–16, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 27–29, 1931.

4 ad. ♂, 1 im. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930, and May 11–21, 1931.

1 ad. ♀, Venezuela, Ciudad Bolívar, December 8, 1929.

This excellent series secured between the Casiquiare and Ciudad Bolívar averages slightly darker above than true *magnirostris* as represented by specimens from British Guiana and may eventually prove to be an undescribed race. With the present material it seems best to refer them to the nominate subspecies as the forms of this hawk in South America are not too well defined or understood at the present time.

The bars on the thighs of the adult males are very variable, apparently without regard to geography. Thus, in some specimens from the Casiquiare and the Upper Orinoco the dark bars are very narrow and dull, rather light olive-brown, while in others from the Upper Orinoco they are much broader and tawny-rufescent. Inasmuch as the bird is not known to be migratory, one can look upon this only as individual variation.

The adult female from the Upper Orinoco, opposite Corocoro Island, March 16, is quite different from all the other specimens in the present series in its dark, distinctly brownish-gray coloration on the upperparts and in having much darker bars on the underparts.

Looking up the mouth of the Já River from the Cauabury, Brazil.

View over Rio Negro at Santa Isabel, Brazil.

Serra Imeri, Brazil. Home of the cock-of-the-rock.

Serra Imeri, Brazil. This great unsurveyed cordillera separates Brazil and Venezuela.

LEUCOPTERNIS MELANOPS (Latham): ***Black-faced Hawk***

Falco melanops LATHAM, Index ornithologicus, vol. 1, 1790, p. 37 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 8, 1930.

3 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 31–April 28, 1931.

A male collected April 28 was noted as being in breeding condition when shot.

As far as I know this fine hawk has not been recorded before from the Rio Negro area. It was not known from Venezuela until very recently when Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, pp. 458–459) listed specimens from the Caura River and Mount Auyán-tepuí.

This series agrees with material from British Guiana. The width of the black streaks on the top of the head and interscapulars is very variable; apparently it averages broader in males and narrower in females. A British Guiana unsexed bird is, however, the most broadly streaked one I have seen. Gilliard (*cit. supra*) writes that comparison of a female taken at Mount Auyán-tepuí with four nearly topotypical specimens "indicates that our specimen may prove worthy of recognition when more material is obtained. Chiefly the Auyán-tepuí specimen disagrees with the series at hand by having ground color on head and neck white, not suffused with buff; by having broader darker shaft streaks on head, nape, shoulders, malar region, auriculars, and anterior flanks, by having dark upperparts, including tail, black instead of brownish black, and, finally, by having no suggestion of the white tail tipping, present in all others. It averages larger than true *melanops:* wing 234.5; tail 147; culmen from base 29.5; exposed culmen 21; tarsus 66 . . ." mm. The present series, which should belong with the Mount Auyán-tepuí bird, completely negatives the characters of the dark shaft streaks on the head, nape, and shoulders, and of the white tail tipping (present in five of our six examples). Our British Guiana bird (unsexed) is just as black on the dark areas of the upperparts and tail as our Orinoco and Rio Negro birds and has the ground color of the head and neck just as white, just as little tinged with buffy, as in them. None of our specimens from Brazil, Venezuela, or British Guiana have any dark shaft streaks on the anterior flanks.

Another specimen taken at Playa de Candela, on the Brazo Casiquiare, February 10, was saved in alcohol.

HYPOMORPHNUS URUBITINGA URUBITINGA (Gmelin): ***Brazilian Urubitinga***

Falco urubitinga GMELIN, Systema naturae, pt. 1, 1788, p. 265 (Brazil).

SPECIMENS COLLECTED

1 im. ♂, 1 im. –, Venezuela, Cerro Yapacana, April 6–26, 1931.

Widely distributed throughout the areas traversed by the expedition.

SPIZAETUS ORNATUS ORNATUS (Daudin): ***Crested Eagle Hawk***

Falco ornatus DAUDIN, Traité d'ornithologie, vol. 2, 1800, p. 77 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 7, 1931.

The nominate race of this fine bird occurs throughout the countries collected in by the expedition. It is replaced by an allied form *S. o. vicarius* in Central America and western South America.

The specimen is in good, fresh plumage.

CIRCUS BUFFONI (Gmelin): ***Buffon's Marsh Hawk***

Falco buffoni GMELIN, Systema naturae, vol. 1, pt. 1, 1788, p. 277 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, near Soledad, Anzoátegui, December 1, 1929.

The bird collected is in good, fresh plumage.

This marsh hawk is a bird of eastern South America from Venezuela and the Guianas to the Straits of Magellan; it is rare in Chile. I know of no definite previous record from Venezuela as far to the west as Soledad, although Chapman (Bull. Amer. Mus. Nat. Hist., vol. 36, 1917, p. 240) lists two melanistic birds, probably of this species, from as far west as the Río Frío, Colombia.

GERANOSPIZA CAERULESCENS (Vieillot): ***Gray Crane-Hawk***

Sparvius caerulescens VIEILLOT, Nouv. Dict. Hist. Nat., vol. 10, 1817, p. 318 (South America; Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 20, 1931.

This single specimen obtained is narrowly barred with white below. It measures: Wing 270, tail 214, culmen from cere 18.4, tarsus 77.2 mm.

Although known from Venezuela and the Guianas south to northern Brazil (Santarém, Obidos, Rio Caissary, etc.) this hawk does not appear to have been recorded as yet from the Rio Negro.

Family FALCONIDAE: Falcons, etc.

MICRASTUR SEMITORQUATUS SEMITORQUATUS (Vieillot): ***Collared Harrier-Falcon***

Sparvius semi-torquatus VIEILLOT, Nouv. Dict. Hist. Nat., vol. 10, 1817, p. 322 (Paraguay, *ex* Azara).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 5, 1931.

The bird was noted as being in breeding condition when collected; it had a shell-less egg in the oviduct.

It has the following dimensions: Wing (abraded) 266+, tail (abraded) 243+, culmen from cere 20.8, tarsus 90 mm., and therefore agrees with the nominate race of which it is probably one of the northernmost examples on record. As far as I have been able to learn, it is

the first specimen to be collected in Venezuela and is an addition to the avifauna of that country. The northern race *M. s. naso* has been taken in northern Venezuela (Perijá and other localities).

MICRASTUR MIRANDOLLEI (Schlegel): *Mirandolle's Harrier-Falcon*

Astur mirandollei SCHLEGEL, Mus. Hist. Nat. Pays-Bas, vol. 2, 1862, Astures, p. 27 (Surinam).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 31, 1931.

Even if Griscom and Greenway's Panamanian race of this species, *M. m. extimus*, should prove to be valid (the material I have seen does not enable me to recognize it with any feeling of certainty), the present specimen would be of the typical subspecies.

This is apparently a rather rare bird everywhere in all its vast range from Costa Rica to Peru and northern Brazil. The present specimen has the following dimensions: Wing 230, tail 198, culmen from cere 22.3, tarsus 73 mm.

MICRASTUR RUFICOLLIS GILVICOLLIS (Vieillot): *White-throated Harrier-Falcon*

Sparvius gilvicollis VIEILLOT, Nouv. Dict. Hist. Nat., vol. 10, 1817, p. 323 (no locality = Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 6, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, December 27, 1930.

This gray-breasted race of its species occurs in the Guianas and southern Venezuela (Mount Auyán-tepuí) southward to the Amazon Valley. It has not been recorded as yet from the Upper Orinoco or the Casiquiare; in fact, the only Venezuelan locality to date seems to be Mount Auyán-tepuí.

The specimens collected are in fine, fresh plumage.

DAPTRIUS ATER Vieillot: *Yellow-throated Caracara*

Daptrius ater VIEILLOT, Analyse d'une nouvelle ornithologie élémentaire, 1816, p. 68 (Brazil).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

Found sparingly throughout the areas traversed by the expedition.

The white basal area of one of the middle rectrices has a black blotch in it, apparently a type of individual variation common in this species as the majority of examples seen have one or more such spots, but no two birds are alike in this respect.

Two other specimens from the Brazo Casiquiare, one taken at Cerro Guanari, February 4, and one at Cerro Mabinagui, February 20, were saved as alcoholics.

DAPTRIUS AMERICANUS AMERICANUS (Boddaert): ***Red-throated Caracara***

Falco americanus BODDAERT, Table des planches enluminéez . . ., 1783, p. 25 (*ex* Daubenton, planches enluminées . . ., pl. 417, no locality = Cayenne, *ex* Buffon).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

The remiges and rectrices of this specimen are rather abraded terminally; otherwise the bird is in good plumage.

MILVAGO CHIMACHIMA CORDATUS Bangs and Penard: ***Panama Caracara***

Milvago chimachima cordatus BANGS and PENARD, Bull. Mus. Comp. Zool., vol. 62, 1918, p. 35 (San Miguel Island, Pearl Islands, Bay of Panama).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 20, 1931.

The light and dark tail bands in this example are of approximately equal width, agreeing with the characters of *cordatus*. The locality of our bird is probably the southernmost from which the form has been recorded in Venezuela. It occurs on Mount Auyán-tepuí but apparently has not been found on Mount Duida.

FALCO ALBIGULARIS ALBIGULARIS Daudin: ***Bat Falcon***

Falco albigularis DAUDIN, Traité d'ornithologie, vol. 2, 1800, p. 131 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Río Negro, opposite San Carlos, altitude 350 feet, January 29, 1931.

A specimen in good, though not fresh, plumage. This pretty little falcon occurs throughout the regions traversed by the expedition.

FALCO FEMORALIS FEMORALIS Temminck: ***South American Aplomado Falcon***

Falco femoralis TEMMINCK, Nouveau recueil de planches coloriées d'oiseaux, livr. 58, 1822, pl. 121, livr. 21, pl. 343 (Brazil, *ex* Natterer).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, near Soledad, Anzoátegui, December 1, 1929.

In spite of the fact that the specimen is labeled adult, it is apparently an immature bird, being one of those individuals with heavy markings of black on the upper breast, causing that area to appear almost solidly black. It is of very large size for this form, having the following dimensions: Wing 262.5, tail 175, culmen from cere 16.6, tarsus 44.6 mm.

The present race ranges over the greater part of South America from Colombia to Tierra del Fuego, but not in the Ecuadorian and Peruvian Andes, where it is replaced by *F. f. pichinchae* Chapman.

FALCO SPARVERIUS INTERMEDIUS (Cory): ***Colombian Sparrow Hawk***

Cerchneis sparveria intermedia CORY, Publ. Field Mus. Nat. Hist., Orn. Ser., vol. 1, 1916, p. 325 (Villavicencio, 1,600 feet, base of eastern Andes, Colombia).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 23, 1931.

This specimen has the breast dull ochraceous, with narrow, indistinct streaks, and has the upper surface rather narrowly barred with black. The subterminal tail band measures in its greatest width 20.4 mm. The bird is paler and smaller than skins from the Merida region of Venezuela and differs from one from El Sombrero, in the state of Guárico, in having the crown decidedly darker gray. It has the following measurements: Wing 180, tail 116, culmen from base 12, tarsus 31 mm. The present specimen comes from the eastern edge of the range at present assigned to this subspecies.

Family CRACIDAE: Curassows, Guans, etc.

MITU TOMENTOSA (Spix): ***Lesser Razor-billed Curassow***

Crax tomentosa Spix, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 49, pl. 63 (Barcellos, Rio Negro, Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cachoeira Destacamento, Rio Cauabury, October 29, 1930.
1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 19, 1930.
1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, December 1, 1930.
1 ad. ♂, Venezuela, Brazo Casiquiare, Curare, February 7, 1931.

A fine series of a bird still uncommon in collections.

CRAX ALECTOR Linnaeus: ***Crested Curassow***

Crax alector Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 269 (Cayenne).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, Base Camp, 322 feet, March 19–22, 1931.

The immature bird shows signs of molt.

This fine curassow inhabits the tropical forests from the three Guianas south to the north bank of the Amazon, west to the Rio Negro, and across southern Venezuela to the east slopes of the eastern Andes in Colombia.

PENELOPE GRANTI ORIENTICOLA Todd: ***Rio Negro Guan***

Penelope jacquacu orienticola Todd, Proc. Biol. Soc. Washington, vol. 45, 1932, p. 211 (Manacapurú, Rio Solimões, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, opposite Buena Vista, February 4, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

The female is molting in the wings.

These specimens have long tails (300–345 mm.) and are therefore *granti* Berlepsch and not *marail* Müller.

Conover and Phelps (Bol. Soc. Venezolana Cienc. Nat., vol. 10, 1947, 321, 325) have listed the present examples in their account of the races of this guan.

ORTALIS MOTMOT MOTMOT (Linnaeus): *Guiana Chachalaca*

Phasianus motmot Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 271 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 23, 1931.

The bird collected is in molting condition.

The Guiana chachalaca ranges across the areas traversed by the expedition. It occurs in the three Guianas, southern Venezuela, and northern Brazil, south to the north bank of the Amazon, west to the Rio Negro. The present specimen and those mentioned by Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 460) from Mount Duida are probably the southwesternmost records from Venezuela.

PIPILE CUMANENSIS CUMANENSIS (Jacquin): *White-headed Piping Guan*

Crax (cumanensis) Jacquin, Beyträge zur Geschichte der Vögel, 1784, p. 25, pl. 10 (Orinoco River region near Cumaná, Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Curare, February 7, 1931.
3 ad. ♂, Venezuela, Brazo Casiquiare, February 17, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.

This fine series is remarkably uniform. The female from Curare is molting in the tail, the outermost rectrices being only partly grown.

Ranges from French and British Guiana west across southern Venezuela, and northern Brazil to eastern Colombia, Ecuador, and Peru.

Family PHASIANIDAE: Pheasants, Quails, etc.

COLINUS CRISTATUS SONNINI (Temminck): *Sonnin's Crested Quail*

Perdix sonnini Temminck, Histoire naturelle génerale des pigeons et des gallinacés, vol. 3, 1815, p. 451 (no locality stated, but evidently French Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 5, 1930.

The supposedly immature male resembles the adult one but is paler, especially on the interscapulars, the back, the wings, and to a lesser extent the occiput.

Sonnini's crested quail occurs from the three Guianas and the adjacent north Brazilian areas, westward along the Orinoco Basin. The present examples probably are among the most southwesterly records for the race.

The present specimens do not agree with the description of *C. c. barnesi* or with topotypical specimens of that race; they are very much paler in coloration.

ODONTOPHORUS GUJANENSIS MEDIUS Chapman: ***Duida Partridge***

Odontophorus gujanensis medius Chapman, Amer. Mus. Nov., No. 380, 1929, p. 3 (Caño Secco, Mount Duida, Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 24–April 1, 1931.

This form of this wide-ranging partridge has the throat and sides of the head grayish as in *buckleyi* but has the underparts ochraceous-tawny as in *gujanensis*. Hellmayr and Conover (Catalogue of birds of the Americas, pt. 1, No. 1, 1942, p. 264, footnote) refer specimens from the uppermost stretches of the Rio Negro (Cocuy) near the Venezuelan boundary, to this race. In other words, here as in so many other species, the birds of the Upper Rio Negro and of the Upper Orinoco are alike. The race ranges from southern Venezuela (Caura and Upper Orinoco Valleys and Mount Duida) to the adjacent parts of extreme northwestern Brazil (Upper Rio Negro and Rio Uaupés).

The male is somewhat paler than the female. Both birds are in fairly fresh plumage.

Family OPISTHOCOMIDAE: Hoatzins

OPISTHOCOMUS HOAZIN (P. L. S. Müller): ***Hoatzin***

Phasianus hoazin P. L. S. Müller, Natursystem, Suppl., 1776, p. 125 (based on "Faisan huppé de Cayenne"; Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 7, 1931.

The single specimen of this peculiar bird obtained is in fine, fresh plumage.

Family ARAMIDAE: Limpkins

ARAMUS GUARAUNA GUARAUNA (Linnaeus): ***Southern Limpkin***

Scolopax guarauna Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 242 (based on "Le Courly brun d'Amerique" Brisson, Ornithologia . . ., vol. 5, p. 330, and "Guarauna" Marcgrave, Historiae rerum naturalium Brasiliae libri octo, p. 204; "in America australi"; type from Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, Viudita, February 13, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Piedra Pintada, February 14, 1931.

The female has more white along the midventral line than the male. Both birds are in good but slightly worn plumage.

The southern limpkin is widely distributed over tropical South America from Panama to northern Argentina. If Vieillot's form *A. g. carau* be recognized, the southern limit of the nominate race

would be the Amazon River. Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, p. 39) finds birds from the south side of the Amazon are large like the Paraguayan *carau*.

Family PSOPHIIDAE: Trumpeters

PSOPHIA CREPITANS CREPITANS Linnaeus: ***Common Trumpeter***

Psophia crepitans LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 154 (South America=Cayenne, *ex* Barrére).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 5, 1930.
1 ad. ♂, Venezuela, Brazo Casiquiare, February 18, 1931.
1 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, Base Camp, 322 feet, March 17, 1931.

The male taken on March 17 was in breeding condition when collected.

The common trumpeter occurs from the Orinoco Valley and its associated drainage system of southern Venezuela to the three Guianas and to northern Brazil north of the Amazon, west as far as the Rio Negro. Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, p. 309) have compared Rio Negro with Guiana birds and find no constant differences.

Holt (Nat. Geogr. Mag., vol. 64, Nov. 1933, p. 606) writes of this species that grunter would be a more descriptive name than trumpeter. "Easily tamed, such birds may be seen on the main streets of almost any backwoods village, where they lord it over domestic fowl of every sort . . ."

Family RALLIDAE: Rails, etc.

ARAMIDES CAJANEA CAJANEA (P. L. S. Müller): ***Cayenne Wood Rail***

Fulica cajanea P. L. S. MÜLLER, Natursystem, Suppl., 1776, p. 119 (Cayenne, *ex* Daubenton, Planches enluminées . . . , pl. 352).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 3, 1931.

The two specimens are quite unequal in size, the one from the Casiquiare being considerably larger than the Orinoco bird, but the differences are matched by others in the series examined. The larger bird is also a little darker above and slightly so below.

The nominate race of this species occurs over much of South America from southern Costa Rica to Argentina and Uruguay. It is indeed surprising that a bird that "breaks up" into half a dozen races in Central America should remain so unvarying over an enormous range in South America. It is possible, of course, that larger series will reveal geographic forms there too, but so far the material does not show any.

PORZANA FLAVIVENTER FLAVIVENTER (Boddaert): ***Yellow-breasted Rail***

Rallus flaviventer Boddaert, Table des planches enluminéez . . . , 1783, p. 52 (Cayenne, *ex* Daubenton, Planches enluminées . . . , pl. 847).

SPECIMEN COLLECTED

1 im. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.

Although this little rail has been recorded from many places from the Guianas and Venezuela south to northern Argentina, it is very local in its distribution. It does not seem to have been recorded in print from the Rio Negro area before.

The specimen is in fresh plumage.

Family HELIORNITHIDAE: Sun-grebes

HELIORNIS FULICA (Boddaert): ***Little Sun-grebe***

Colymbus fulica Boddaert, Table des planches enluminéez . . . , 1783, p. 54 (Cayenne, *ex* Daubenton, Planches enluminées . . . , pl. 893).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, below Cachoeira Thomaz, November 2, 1930.
1 ad. ♀, 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 20–21, 1930.

The immature bird is exactly like the adults. One of the adults is just beginning to grow new rectrices; the other is in an earlier stage of molt.

Family EURYPYGIDAE: Sun-bitterns

EURYPYGA HELIAS HELIAS (Pallas): ***Surinam Sun-bittern***

Ardea helias Pallas, Neue Nord. Beytr., vol. 2, 1781, p. 48, pl. 3 (Surinam).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 6, 1930.

The only sun-bittern collected is a bird in its postjuvenal molt.

Holt records that a pair was seen on the Cauabury, probably on the day the above specimen was collected. At San Antonio, on the Upper Orinoco, he noted a free, but apparently man-raised, sun-bittern walking about in the vicinity of the village.

Family JACANIDAE: Jaçanas

JACANA SPINOSA JACANA (Linnaeus): ***South American Jaçana***

Parra jacana Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 259 (South America: Surinam accepted as type locality by Berlepsch, Nov. Zool., vol. 15, 1908, p. 304).

SPECIMEN COLLECTED

1 juv. –, Venezuela, Ciudad Bolívar, December 20, 1929.

This young bird is preserved in alcohol.

Family CHARADRIIDAE: Plovers

BELONOPTERUS CHILENSIS CAYENNENSIS (Gmelin): ***Cayenne Lapwing***

Parra cayennensis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 706 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 4, 1930.

The specimen is in molting condition. It fully agrees with the characters of this race as given by Brodkorb (Occ. Pap. Mus. Zool. Univ. Michigan, No. 293, 1934, pp. 2–4).

The race occurs from Colombia (west to the Atrato and Cauca Valleys) and east through Venezuela and the Guianas to northern Brazil, where it intergrades with *lampronotus* along the Amazon.

HOPLOXYPTERUS CAYANUS (Latham): ***Spur-winged Plover***

Charadrius cayanus LATHAM, Index ornithologicus, vol. 2, 1790, p. 749 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.
1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 4, 1930.

The female marked immature resembles the adult male in plumage and even has the well-developed carpal spur, but it has the black pectoral band much broader than the male.

PLUVIALIS DOMINICA DOMINICA (P. L. S. Müller): ***American Golden Plover***

Charadrius dominicus P. L. S. MÜLLER, Natursystem, Suppl., 1776, p. 116 (Hispaniola).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 13, 1930.

A migrant from North America, going as far south as the Argentine pampa country.

CHARADRIUS COLLARIS Vieillot: ***Collared Plover***

Charadrius collaris VIEILLOT, Nouv. Dict. Hist. Nat., vol. 27, 1818, p. 136 (Paraguay, *ex* Azara).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.

The single example obtained is in molting condition; all the remiges are new and only partly grown. On an island just below San Carlos, Río Negro, Venezuela, on January 27, 1931, Holt found and photographed a chick of this species.

The supposedly smaller northern race *C. c. gracilis* Cabanis appears to be unrecognizable. It has been supported, however, fairly recently by Laubmann (Vögel Paraguay, vol. 1, 1939, p. 89) but more recently it has been "sunk" by Gyldenstolpe (Kungl-Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, pp. 42–43).

Family SCOLOPACIDAE: Sandpipers, etc.

TRINGA MELANOLEUCA (Gmelin): ***Greater Yellowlegs***

Scolopax melanoleuca GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 659 (sandy shores of Labrador=Chateau Bay, Labrador).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Soledad, Anzoátegui, November 29, 1929.

A migrant from North America, the greater yellowlegs has been recorded throughout the length of the South American Continent.

TRINGA SOLITARIA SOLITARIA Wilson: ***Eastern Solitary Sandpiper***

Tringa solitaria WILSON, American ornithology, vol. 7, 1813, p. 53, pl. 58, fig. 3 (Pocono Mountain, Pennsylvania, Kentucky, New York).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Manáos, September 27, 1930.
1 im. ♀, Brazil, São Gabriel, Rio Negro, December 30, 1930.

These two specimens are small having wings of 126.6 and 130 mm., respectively, and therefore agree with the nominate form according to the account of the species given by Conover (Auk, 1944, pp. 537–544). They also have the white supraloral streak characteristic of typical *solitaria*.

A migrant from North America.

ACTITIS MACULARIA (Linnaeus): ***Spotted Sandpiper***

Tringa macularia LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 249 (Europe and North America=Pennsylvania, *ex* reference to Edwards, pl. 277, fig. 2).

SPECIMEN COLLECTED

1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 10, 1930.

A migrant from North America; winters south to Bolivia and southern Brazil.

Family LARIDAE: Gulls and Terns

PHAETUSA SIMPLEX SIMPLEX (Gmelin): ***Great-billed Tern***

Sterna simplex GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 606 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.
1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 4, 1930.

The January specimen was noted as having enlarged gonads.

This fine tern occurs along the larger rivers and the coasts of northern South America south to the Amazon Valley, to Pernambuco, and to Bahia along the east coast.

STERNA SUPERCILIARIS Vieillot: ***South American Least Tern***

Sterna superciliaris VIEILLOT, Nouv. Dict. Hist. Nat., vol. 32, 1819, p. 176 (Paraguay, *ex* Azara, No. 415).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.

The single specimen obtained is in molt into adult plumage and presents a mixture of its old and new feathering.

Family RYNCHOPIDAE: Skimmers

RYNCHOPS NIGRA CINERASCENS Spix: ***Brazilian Skimmer***

Rhynchops cinerascens Spix, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 80, pl. cii (Rio Amazonas).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 10, 1931.

The under wing coverts in the female are slightly darker than in the male. The two specimens are in perfect breeding plumage. They are included in the locality records given by Wetmore (Caldasia, vol. 3, No. 1, 1944, p. 115).

Family COLUMBIDAE: Pigeons

COLUMBA SPECIOSA Gmelin: ***Scaled Pigeon***

Columba speciosa Gmelin, Systema naturae, vol. 1, pt. 2, 1789, p. 783 (based on "Pigeon ramier, de Cayenne" Daubenton, Planches enluminées . . ., pl. 213: Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 10, 1930.

The single specimen obtained was noted as being in breeding condition when collected.

This is a wide-ranging, nonvarying bird that occurs without racial differentiation from southeastern Mexico to southern Matto Grosso and to Paraguay.

COLUMBA CAYENNENSIS CAYENNENSIS Bonnaterre: ***Rufous Pigeon***

Columba cayennensis Bonnaterre, Tabl. Enc. Méth., Ornithologie, vol. 1, livr. 51, 1792, p. 234 (based on "Le Pigeon Ramier de Cayenne" Holandre, Abrégé Hist. Nat., vol. 2, 1790, p. 214: Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 13, 1930.
1 ad. ♀, 1 im. ♀, Brazil, São Gabriel, Rio Negro, January 10–17, 1931.
1 im. ♂, Venezuela, Brazo Casiquiare, February 6, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Pamoni, February 19, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.
6 ad. ♂, 2 ad. ♂, 1 im. ♀, 1 ad. –, Venezuela, Puerto Ayacucho, Río Orinoco, January 5–10, 1930, and May 9–20, 1931.

One of the May birds was noted as being in breeding condition when collected.

These birds are quite variable, especially in degree of darkness or of pallor on the abdomen and flanks.

This is the species that used to be called *rufina*. The material available for study is not sufficient to enable us to come to any independent decision as to the validity of *andersoni* Cory, and we follow Hellmayr and Conover, the latest reviewers of the group (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, p. 455) in considering it a synonym of *cayennensis*. Some years earlier Pinto (Rev. Mus. Paulista, vol. 22, 1938, p. 157) came to the same conclusion, although he used the name *rufina*. Peters (Check list of birds of the world, vol. 3, 1937, p. 67), on the other hand, considers *andersoni* a valid form. If future material should substantiate this race the present series would have to be referred to it. In the original description Cory (Publ. Field Mus. Nat. Hist., Orn. Ser., vol. 1, No. 7, 1913, p. 294–295) states that *andersoni* has the lower abdomen and under tail coverts slate gray, "nearly as in *sylvestris*." This is not true of the present series.

Recently Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, p. 44–45) has found that *sylvestris* occurs north to the north side of the middle stretches of the Amazon, but it clearly does not extend up the Rio Negro.

COLUMBA SUBVINACEA PURPUREOTINCTA Ridgway: ***Purple-tinted Ruddy Pigeon***

Columba purpureotincta Ridgway, Proc. U. S. Nat. Mus., vol. 10, 1888, p. 594, footnote (Demerara, British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 3–5, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Raudal San Sebastián, February 1, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.
1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 20, 1931.
1–, Venezuela, Ciudad Bolívar, December 8, 1929.

The example collected on May 20 was noted as having the gonads active and enlarged.

It appears that Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, p. 467) are justified in placing *purpureotincta* as a race of *C. subvinacea*.

The Ciudad Bolívar specimen shows no approach to the description of *C. s. peninsularis* Chapman and appears to be the northernmost Venezuelan record for *purpureotincta*. Chapman's race *peninsularis* is said to be darker vinaceous below and more reddish, less olivaceous on the wings, back, and tail than *purpureotincta*, but the Ciudad Bolívar specimen reverses this if anything when compared with the rest of the series. Hellmayr and Conover record undiluted *purpureotincta* as far down the Orinoco as Maipures, but the present material shows that this race continues at least as far east as Ciudad Bolívar.

ZENAIDURA AURICULATA STENURA (Bonaparte): ***Colombian Eared Dove***

Zenaida stenura Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 40, No. 3, Jan. 1855, p. 98 ("Columbia" = Colombia).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Ciudad Bolívar, June 11, 1931.

This bird has the dull coloration characteristic of this race.

The nomenclature here followed is that advocated by Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, p. 490).

SCARDAFELLA SQUAMMATA RIDGWAYI Richmond: ***Ridgway's Scaled Dove***

Scardafella ridgwayi Richmond, Proc. U. S. Nat. Mus., vol. 18, 1896, p. 660 (Margarita Island, Venezuela).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Soledad, June 11, 1931.

The bird was in breeding condition when collected. It is one of those specimens in which the black barring is relatively narrow, apparently a purely individual variation. It agrees with others from northern Venezuela.

COLUMBIGALLINA PASSERINA GRISEOLA (Spix): ***Grayish Ground Dove***

Columbina griseola Spix, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 58, pl. 75 a, fig. 2 ("in sylvis fl. Amazonum," Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 31, 1930–January 16, 1931.

The black bill and dark coloration characteristic of *griseola* are well shown in these specimens.

COLUMBIGALLINA PASSERINA ALBIVITTA (Bonaparte): ***Cartagena Ground Dove***

Chamaepelia albivitta Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 40, No. 1, Jan. 1855, p. 21 ("Bogota").

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 8, 1930.

This race differs from the preceding in the lighter color of the posterior underparts and in the paler bill.

Another example from Puerto Ayacucho was preserved in alcohol.

COLUMBIGALLINA MINUTA MINUTA (Linnaeus): ***Plain-breasted Ground Dove***

Columba minuta Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 285 (based on "Turtur parvus fuscus americanus" Brisson, Ornithologia, vol. 1, p. 116, pl. 8, fig. 2: "San Domingo," errore; Cayenne substituted as type locality by Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 119).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Venezuela, San Antonio, Upper Orinoco, March 2–5, 1931.
1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 6, 1930.

The two males are, respectively, adult and immature, but not as indicated on the labels. By some strange trick of fate, the adult bird is the one marked immature, and vice versa.

COLUMBIGALLINA TALPACOTI RUFIPENNIS (Bonaparte): ***Red-winged Talpacoti Dove***

Chamaepelia rufipennis Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 40, No. 1, Jan. 1855, p. 22 (environs of Cartagena, Colombia).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Cucuhy, Rio Negro, February 1, 1930.

This specimen has the outer web of the outer primary entirely dusky brown but is otherwise like typical *rufipennis*. Cucuhy must be close to the southern limit of the range of the race.

LEPTOTILA VERREAUXI BRASILIENSIS (Bonaparte): ***Guianan White-fronted Dove***

Peristera brasiliensis Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 43, No. 20, Nov. 17, 1856, p. 945 (no locality given).

SPECIMENS COLLECTED

2 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 12–14, 1931.
1 ad. ♀, Venezuela, Soledad, November 29, 1929.

All these examples are darker, less brownish above, when compared with *L. v. verreauxi* from Panama and western Costa Rica, and also have the hind neck and back grayer.

LEPTOTILA RUFAXILLA DUBUSI Bonaparte: ***Dubus's Gray-fronted Dove***

Leptoptila dubusi Bonaparte, Comp. Rend. Acad. Sci. Paris, vol. 40, No. 3, Jan. 15, 1855, p. 99 (banks of the Río Napo, Ecuador).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, mouth of Rio Maturacá, November 8, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 3–15, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, February 11, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, February 28, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 14, 1931.
2 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–22, 1931.
1 ad. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Rio Orínoco, January 3, 1930, and May 14–16, 1931.

Several of the Venezuelan specimens (March, April, and May) were noted as being in breeding condition when collected.

According to Peters (Check list of birds of the world, vol. 3, 1937, p. 126) *dubusi* ranges from southeastern Colombia and eastern Ecuador, eastward to the base of Mount Duida, and the limits of its

range in Brazil are not known. Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, pp. 590–591) write that it extends eastward to the Rio Purús. The present specimens from the upper Rio Negro help fill in the gap between these accounts and certainly are not different from the Upper Orinoco series, which, in turn, are clearly referable to the same race as the birds of the base of Mount Duida.

The nominate form extends westward in northern Brazil only to the Rio Jamundá, as far as known, although in southeastern Venezuela it has been recorded from farther west—from Mount Roraima and Mount Auyán-tepuí. Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 463) includes, without any new evidence, the Upper Orinoco and "northern Brazil," but it seems likely that he would find on reexamination of his material that the birds of the Upper Orinoco and of adjacent parts of Brazil are not *rufaxilla* but *dubusi*.

OREOPELIA MONTANA MONTANA (Linnaeus): ***Ruddy Quail-dove***

Columba montana LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 163 (Jamaica).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 6, 1931.
1 ad. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
1 ad. ♂, Venezuela, Solano, Brazo Casiquiare, February 2, 1931.
8 ad. ♂, 7 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 31–April 28, 1931.

A number of the Cerro Yapacana birds were in breeding condition when collected.

It is not too well established that the race *martinica* is really valid, but the arrangement of Hellmayr and Conover (Catalogue of the birds of the Americas, pt. 1, No. 1, 1942, pp. 601–606) is here followed. It is true that in continental South America (and north to Mexico) there are no local subspecies of this wide-ranging pigeon.

Family PSITTACIDAE: Parrots

ARA ARARAUNA (Linnaeus): ***Blue and Yellow Macaw***

Psittacus ararauna LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 98 ("South America," Brazil).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 18, 1931.

The bird is in worn plumage.

ARA MACAO (Linnaeus): ***Scarlet Macaw***

Psittacus macao LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 96 ("South America").

SPECIMENS COLLECTED

2 ad. ♀, Venezuela, right bank Upper Orinoco, opposite Corocoro Island, March 16, 1931.

Salto do Huá, Brazil, showing camp of the expedition.

Rio Cauabury, Brazil. View downstream from above Bocca do Já.

View showing the Serro do Cabary to the northwest of São Gabriel, Brazil.

Panoramic view to the northwest of São Gabriel, Brazil.

The rectrices are fairly abraded as is so often the case with these long-tailed macaws.

ARA CHLOROPTERA Gray: ***Red, Blue, and Green Macaw***

Ara chloroptera GRAY, List of the specimens of birds in the collection of the British Museum, pt. 3, Psittacidae, 1859, p. 26 (British Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, December 8, 1930.
1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 9, 1930.

The female is considerably darker red on the underparts than the male.

ARA SEVERA CASTANEIFRONS Lafresnaye: ***Lafresnaye's Macaw***

Ara castaneifrons LAFRESNAYE, Rev. Zool., 1847, p. 66 (Bolivia).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.

This specimen has a wing length of 243 mm., thereby agreeing in size with the race *castaneifrons*. Peters (Check list of birds of the world, vol. 3, 1937, p. 183) writes that birds from the Upper Amazon are probably referable to this form, but that birds from the Orinoco are typical *severa*. Apparently the two races meet on the Upper Orinoco in extreme southern Venezuela. It appears that the race *castaneifrons* has not been recorded before from Venezuela.

The present specimen is in badly worn plumage; when freshly feathered its dimensions would probably have been still greater.

ARATINGA PERTINAX AERUGINOSA (Linnaeus): ***Brown-throated Parakeet***

Psittacus aeruginosus LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 98, No. 12 (America="West Indies," *ex* Edwards; Calamar, Lower Magdalena River, Colombia, suggested as type locality by Chapman, Bull. Amer. Mus. Nat. Hist., vol. 36, 1917, p. 257).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 16, 1931.
1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 20, 1931.

These two specimens appear to be closer to *aeruginosa* than to *chrysophrys*. The male is darker than the female both above and below, and also larger.

ARATINGA PERTINAX MARGARITENSIS (Cory): ***Margaritan Brown-throated Parakeet***

Eupsittula pertinax margaritensis CORY, Publ. Field Mus. Nat. Hist., Zool. Ser., vol. 13, pt. 2, 1918, p. 63 (Margarita Island).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, Venezuela, Soledad, December 4, 1929, and June 11–12, 1931.
1 ad. ♂, Venezuela, Ciudad Bolívar, June 11, 1931.

These birds have the brown of the sides of the head distinctly paler than *chrysophrys*, in this respect agreeing with *margaritensis*.

After careful comparison with 17 skins of the latter form in the collections of the National Museum and the Chicago Natural History Musuem, the only difference noted by Wetmore is a slightly lighter shade of the breast, sides, and abdomen, particularly in the green areas. Although with additional material this may be looked upon as sufficient to set off another form, it seems best, for the present at least, to use the name *margaritensis* for specimens from northeastern Venezuela as well as from Margarita Island. Peters (Check list of birds of the world, vol. 3, 1937, p. 190) has commented also on the resemblances between birds from the mainland and those of Margarita Island.

PYRRHURA MELANURA MELANURA (Spix): ***Black-tailed Parakeet***

Aratinga melanurus SPIX, Avium species novae . . . Brasiliam . . . , vol. 1, 1824, p. 36, pl. 22 (Tabatinga, Rio Solimöes, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cachoeira Thomaz, Rio Cauabury, October 26, 1930.
7 ad. ♂, 3 ad. ♀, Brazil, São Gabriel, Rio Negro, January 12–16, 1931.

Two of the São Gabriel males, marked "adult" by the collectors, have none of the outer greater upper primary coverts red like all the others but have the whole wing area green except for the bluish outer webs of the primaries. In all other respects they agree perfectly with the rest of the series.

This race occurs from the Upper Orinoco to the Rio Negro and to northwestern Amazonia, southwest to northeastern Peru, and to the Solimöes River.

Two additional examples from São Gabriel, January 13, 1931, were preserved in alcohol.

FORPUS SCLATERI EIDOS Peters: ***Schomburgk's Parrotlet***

Forpus sclateri eidos PETERS, Check list of birds of the world, vol. 3, 1937, p. 205 (new name for *Psittacula modesta* Cabanis, 1848; not Fraser, 1845; British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cachoeira Caranguejo, Rio Cauabury, October 25, 1930.
1 im. ♀, Brazil, Sitio Conobany, Rio Cauabury, October 25, 1930.
2 ad. ♂, Brazil, Rio Cauabury, below mouth of Rio Já, November 3, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 15, 1931.
2 ad. ♂, Colombia, bank of Río Negro, January 29, 1931.

The immature female has the forehead and front half or more of the crown very pale yellowish green in sharp contrast to the dark green of the occiput and back.

This parrot occurs across the Upper Rio Negro and Upper Rio Orinoco to the Guianas in the northeast and to the Rio Madeira in the southwest.

Another specimen, preserved in alcohol, was taken at São Gabriel, January 15, 1931.

FORPUS PASSERINUS CYANOCHLORUS (Schlegel): ***Schlegel's Parrotlet***

Psittacula cyanochlora "Natterer" SCHLEGEL, Mus. Hist. Nat. Pays-Bas, vol. 3, 1864, Psittaci, p. 31 (Forte do Rio Branco, Brazil) (in synonymy of *Psittaculus sancti-thomae* ("Kuhl"), not *Psittacus St. Thomae* P. L. S. Müller).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 6, 1931.

In the absence of comparative material, this subspecific identification is made on geographic grounds, but even at that it is open to reexamination as São Gabriel is a good distance west of the Rio Branco, where *cyanochlorus* is known to occur.

FORPUS PASSERINUS VIRIDISSIMUS (Lafresnaye): ***Green Parrotlet***

Psittacula viridissima LAFRESNAYE, Rev. Zool., 1848, p. 172 (Caracas, Venezuela).

SPECIMENS COLLECTED

4 ad. ♂, 1 im. ♂, Venezuela, Soledad, June 12, 1931.

Three of the adults were in breeding condition according to the collector's notes.

BROTOGERIS JUGULARIS CYANOPTERA (Pelzeln): ***Deville's Parakeet***

Sittace cyanoptera "Natterer Cat. MS." PELZELN, Zur Ornithologie Brasiliens, 1870, p. 260 (in synonymy of *Brotegeris jugularis* (Deville)) (Rio Icanna, Rio Vaupé, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cachoeira Manajó, Rio Cauabury, October 30, 1930.
2 ad. ♂, Brazil, Rio Cauabury, below mouth of Rio Já, November 3, 1930.
1 ad. ♀, Brazil, Camanãos, Rio Negro, December 23, 1930.
2 ad. ♂, 4 ad. ♀, Brazil, São Gabriel, Rio Negro, January 1–5, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Chapazon, right bank of Brazo Casiquiare, January 30, 1931.
2 ad. ♀, 1 im. ♀, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.
2 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 8–15, 1931.

On the whole the October to early January birds are less abraded than those collected between the end of January and mid-April.

Peters (Check list of birds of the world, vol. 3, 1937, p. 207) credits the name *cyanoptera* to Salvadori (Catalogue of the birds in the collection of the British Museum, vol. 20, 1891, p. 261), but all that that author does is to list Pelzeln's listing of the name. It appears that von Pelzeln, 1870, is the real starting place of this term in nomenclature.

Two other specimens from São Gabriel were preserved in alcohol.

BROTOGERIS CHRYSOPTERUS TENUIFRONS Friedmann: ***Rio Negro Parakeet***

Brotogeris chrysopterus tenuifrons FRIEDMANN, Proc. Biol. Soc. Washington, vol. 58, 1945, p. 114 (Santa Isabel, Rio Negro, Amazonas, Brazil).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 13, 1930.
1 im. ♀, Brazil, Rio Negro, mouth of Rio Cauabury, October 22, 1930.

This is the original series on the basis of which this race was first described. As stated in the description, it agrees with the nominate form above and with *tuipara* of the south bank of the Lower Amazon below. It has the chin spot orange (not brownish as in the nominate form) but has practically no frontal band, and what little there is is not orange (as in *tuipara*) but brownish, almost as in *chrysopterus*. It is known only from the Upper Rio Negro (Santa Isabel, and at the mouth of the Rio Cauabury).

AMAZONA AMAZONICA AMAZONICA (Linnaeus): ***Orange-winged Parrot***

Psittacus amazonicus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 147 (Surinam, errore="le pays des Amazones," Hellmayr, Nov. Zool., vol. 17, 1910, p. 406).

SPECIMENS COLLECTED

5 ad. ♂, 2 im. ♂, 4 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 10, 1930, and May 12–23, 1931.

This is the common large green parrot of the areas worked over by the expedition.

AMAZONA FARINOSA FARINOSA (Boddaert): ***Mealy Parrot***

Psittacus farinosus Boddaert, Table planches enluminéez . . . . , 1783, p. 52 (Cayenne, *ex* Daubenton, Planches enluminées . . . , pl. 861).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, right bank Upper Orinoco, opposite Corocoro Island, March 16, 1931.

The yellow on the head of this specimen is restricted to a single feather, making the bird about as close to the race *inornata* as to *farinosa*. The former form occurs south from Panama and northern South America to the Caura River in Venezuela, while the latter ranges from the Caura–Orinoco Basin to Surinam and southward to eastern Peru and to Matto Grosso.

AMAZONA OCHROCEPHALA OCHROCEPHALA (Gmelin): ***Yellow-headed Parrot***

Psittacus ochrocephalus Gmelin, Systema naturae, vol. 1, pt. 1, 1788, p. 339 (South America, restricted to Venezuela by Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 109).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 20, 1931.

Both specimens show traces of molt.

PIONUS MENSTRUUS (Linnaeus): ***Blue-headed Parrot***

Psittacus menstruus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 148 (Surinam).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 3, 1931.

An unusually richly colored individual in fresh plumage. From a study of admittedly inadequate material it appears that birds of upper

Amazonia (eastward to Santarém) may be more brightly colored and have the blue more extensive on the breast and upper abdomen than in Guianan examples.

PIONITES MELANOCEPHALA MELANOCEPHALA (Linnaeus): ***Black-headed Caique***

Psittacus melanocephalus LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 149 ("Mexico" = Caracas, *i. e.*, Venezuela, *ex* Edwards, Gleanings of natural history, pl. 169).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 6, 1931.
5 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–29, 1931.

One of the Cerro Yapacana males was noted as having active, enlarged gonads when collected.

TOUIT PURPURATA VIRIDICEPS Chapman: ***Chapman's Parrotlet***

Touit purpurata viridiceps CHAPMAN, Amer. Mus. Nov., No. 380, 1929, p. 10 (Savana Grande, 330 feet, southeastern base of Mount Duida, Venezuela).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 12, 1931.

It seems that this is the first specimen taken except at the type locality and therefore constitutes a slight western extension of the known range of the race. It agrees with Chapman's description, having the entire crown, nape, and sides of the head green like the back. Its dimensions are: Wing 120, tail 47.3; culmen from cere 16.1 mm.

Family CUCULIDAE: Cuckoos

COCCYZUS MELACORYPHUS Vieillot: ***Azara's Cuckoo***

Coccyzus melacoryphus VIEILLOT, Nouv. Dict. Hist. Nat., vol. 8, 1817, p. 271 (Paraguay).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 16, 1931.
1 ad. ♂, 2 im. ♀, 1 im.–, Venezuela, Ciudad Bolívar, June 8–11, 1931.

One of the June birds was in molt when collected, while another is in such abraded condition that it must have been ready to begin its molt. As a matter of fact, it does show some signs of molt on the occiput.

This cuckoo is found across the regions traversed by the expedition wherever open bushy country occurs. It is not a denizen of the deep forests which cover so much of the basins of the Rio Negro and the Upper Orinoco.

MICROCOCCYX PUMILUS (Strickland): ***Dwarf Cuckoo***

Coccyzus pumilus STRICKLAND, Contr. Orn., 1852, p. 28, pl. 82 ("Trinidad").

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, Venezuela, Soledad, Anzoátegui, June 12, 1931.

Both specimens were noted as having enlarged, active gonads when collected, indicating that the "immature" male may well have been fully adult, as there is nothing in its plumage to indicate youthfulness.

PIAYA CAYANA OBSCURA Snethlage: ***Snethlage's Squirrel Cuckoo***

Piaya cayana obscura SNETHLAGE, Journ. für Orn., 1908, p. 21 (Bom Lugar, Rio Verde, Upper Rio Purús, western Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 17, 1930.
3 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 13–14, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.
2 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 25–April 18, 1931.

These specimens considerably extend the previously known range of this cuckoo. All of them are deep brown above and gray below, with the under surface of the rectrices (except the middle pair) black, tipped with white. The one from San Antonio is lighter brown above than the others and so shows a slight approach to *columbiana*. All are very distinct in appearance from the specimen of *columbiana* taken at Soledad, and they differ from *P. c. cayana* in being slightly darker brown above and in having the under tail coverts lighter.

PIAYA CAYANA COLUMBIANA (Cabanis): ***Colombian Squirrel Cuckoo***

Pyrrhococcyx columbianus CABANIS, Journ. für Orn., 1862, p. 170 (Cartagena, Colombia).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Soledad, Anzoátegui, November 29, 1929.

This race is much paler than *C. c. obscura*.

PIAYA MELANOGASTER MELANOGASTER (Vieillot): ***Black-bellied Cuckoo***

Cuculus melanogaster VIEILLOT, Nouv. Dict. Hist. Nat., vol. 8, 1817, p. 236 (Java, error=Cayenne by substitution of Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 97).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 12–13, 1931.
1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 21, 1930.
1 ad. ♂, Brazil, Cucuhy, Rio Negro, February 4, 1930.
1 ad. ♀, Venezuela, Capibara, Brazo Casiquiare, February 16, 1931.
3 ad. ♂, 2 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 23, 1931.

One of the April birds was noted as having enlarged active gonads when collected.

The Cucuhy bird is slightly paler than any of the others and has a slightly shorter bill, suggesting in these characters an approach to the race *ochracea* Cory, known from Yurimaguas, Peru. It cannot be considered as belonging there, however, for it has these characters

only slightly developed and it comes from an area on all sides of which the nominate form occurs. Pinto (Rev. Mus. Paulista, vol. 22, 1938, p. 175, footnote) finds that birds from the Rio Juruá show a trend in the direction of *ochracea*.

TAPERA NAEVIA NAEVIA (Linnaeus): ***Striped Cuckoo***

Cuculus naevius Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 170 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Ciudad Bolívar, June 9, 1931.

This specimen is in exceedingly worn plumage and shows signs of molting in the wings.

CROTOPHAGA MAJOR Gmelin: ***Greater Ani***

[*Crotophaga*] *major* Gmelin, Systema naturae, vol. 1, 1788, p. 363 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 17, 1931.

CROTOPHAGA SULCIROSTRIS Swainson: ***Groove-billed Ani***

Crotophaga sulcirostris Swainson, Philos. Mag., 1827, p. 440 (Mexico).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 6, 1930.

CROTOPHAGA ANI Linnaeus: ***Ani***

Crotophaga ani Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, p. 105 (Brazil).

SPECIMENS COLLECTED

2 ad. ♂, Brazil, Manáos, September 29, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 10, 1931.
1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 5, 1931.
1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 9, 1931.
1 im. ♂, Venezuela, Ciudad Bolívar, November 25, 1929.

Another specimen from São Gabriel was preserved in alcohol.

Family STRIGIDAE: Owls

OTUS WATSONII WATSONII (Cassin): ***Watson's Screech Owl***

Ephialtes watsonii Cassin, Proc. Acad. Nat. Sci. Philadelphia, vol. 4, 1848, p. 123 (South America=Orinoco River, Venezuela, cf. Chapman, Amer. Mus. Nov., No. 332, 1928, p. 2).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, western foothills, December 3, 1930.
1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 20, 1931.

The Venezuelan example is somewhat paler on the breast and abdomen and also, to a lesser extent, on the back, than are the Brazilian examples, and it is also somewhat smaller, the wing about 10 mm. shorter. Another female, from eastern Ecuador, agrees with

the Serra Imeri bird and not with the one from the Upper Orinoco. Similarly, our east Ecuadorian male agrees with the present Brazilian one. None of the birds seen approach the figure of *O. w. usta* Sclater (Trans. Zool. Soc. London, vol. 4, 1859, pl. 61), but Chapman (Amer. Mus. Nov., No. 332, 1928, p. 3) states that "Sclater's plate suggests *watsoni watsoni* rather than the bird for which I accept the name *usta*." Much more material is needed to elucidate the variations of this owl; at present it is not feasible to tell whether it is a species that breaks up into a number of local races or is merely very variable individually.

PULSATRIX PERSPICILLATA PERSPICILLATA (Latham): *Spectacled Owl*

Strix perspicillata Latham, Index ornithologicus, vol. 1, 1790, p. 58 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930.

Apparently rare or local throughout the Rio Negro–Orinoco country.

CLAUCIDIUM BRASILIANUM PHALAENOIDES (Daudin): *Trinidad Ferrugineous Pygmy Owl*

Strix phalaenoides Daudin, Traité d'ornithologie . . ., vol. 2, 1800, p. 206 (Trinidad).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 23, 1931.
3 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 18–20, 1931.

These four specimens show a mixed assortment of characters that are difficult to reconcile with each other. They were submitted to Dr. John T. Zimmer for his expert opinion and for comparison with the fine material in the American Museum of Natural History, and he found them all to be referable to *phalaenoides*, although by no means all typical of that race. Thus, one of the Puerto Ayacucho birds he found to be very similar to *duidae* in respect to its dark color and unmarked mantle, but with the streaks on the top of the head less obvious than in that race. These streaks are sometimes absent in *phalaenoides* where the mantle is usually more strongly marked, but not always so. Since *duidae*, as currently understood, is a form of high elevations, it appears that this specimen may be looked upon as *phalaenoides* but showing a trend toward *duidae*. Another one of the Puerto Ayacucho birds, however, has larger spots on the head than it should have, and can be matched in this respect only with typical *brazilianum*. Zimmer writes me that his series of *phalaenoides* come fairly close in this regard and the bird is probably *phalaenoides* at one extreme of its variational range. The third example from Puerto Ayacucho is considerably larger than the other two, but not beyond the range of the series in the American Museum. The Cerro Yapacana bird appears to be a fairly normal *phalaenoides*.

Peters (Check list of birds of the world, vol. 4, 1940, p. 130) gives the range of this owl as "Islands of Trinidad and Margarita; tropical parts of northern Venezuela; Guiana (?)." The present specimens come from a good distance to the south of "northern Venezuela," and this may account for their variational trends toward *duidae* and *brasilianum*. Until good series of birds from the Upper Orinoco can be assembled to determine the limits of variation in that region, the present examples will have to be assigned to *phalaenoides*.

CICCABA HUHULA (Daudin): ***Dark Wood Owl***

Strix huhula DAUDIN, Traité d'ornithologie . . ., vol. 2, 1800, p. 190 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.

This specimen, in molting condition when collected, appears to be the only record for the species from Venezuela. This bird is the one mentioned by Kelso (Synopsis of the American wood owls of the genus *Ciccaba*, 1932, pp. 8–9). I have seen no other specimens of *huhula* and may only point out that the present one differs from the colored plates (Levaillant, Oiseaux d'Afrique, vol. 1, 1796, pl. 41, and Spix, Avium species novae . . . Brasiliam . . ., vol. 1, 1824, pl. 10a) in that it lacks the broad white terminal tail band, the tips of the rectrices being black with a narrow subterminal white band.

Family CAPRIMULGIDAE: Nighthawks, etc.

CHORDEILES PUSILLUS ESMERALDAE Zimmer and Phelps: ***Esmeraldan Least Nighthawk***

Chordeiles pusillus esmeraldae ZIMMER and PHELPS, Amer. Mus. Nov., No. 1338, 1947, p. 1 (Esmeralda, Territorio Amazonas, Venezuela; altitude 100 meters).

SPECIMENS COLLECTED

4 ad. ♂, 4 ad. ♀, Venezuela, Río Negro, San Carlos, January 27–28, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, February 28, 1931.

The fact that the collectors never met with this species in any number except on two days on the Venezuelan headwaters of the Rio Negro makes one wonder if the species may be migratory and whether the meeting with it was due to a sudden flight. Unfortunately, nothing is known of the habits of this nighthawk, and no notes were made as to the condition of the gonads of the examples collected with one exception—a female from San Carlos, January 27, which was in breeding condition.

This race differs from both *pusillus* and *septentrionalis* in having the under tail coverts strongly barred.

CHORDEILES RUPESTRIS (Spix): ***Sand-colored Nighthawk***

Caprimulgus rupestris SPIX, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 2, pl. 2 (Rocky Islands in the Rio Negro, Brazil).

SPECIMENS COLLECTED

4 ad. ♂, 2 ad. ♀, Venezuela, Isla Yagrumo, Río Negro, January 25, 1931.

This fine series of a bird still rare in collections, together with five others, including the types of *xyostictus* and *zaleucus*, suggests that there are no recognizable subspecies of this nighthawk. There is a slight dichromatism in the six Isla Yagrumo birds, which more than offsets the supposed color characters of *xyostictus* and *zaleucus*. As for the supposed size characters, it must be pointed out that in the case of *zaleucus* Oberholser (U. S. Nat. Mus. Bull. 86, 1914, p. 118) calls the type an adult female, while admitting that it is marked "male" on the original label, while in *xyostictus* (ibid., p. 116) he gives the type as an adult male, but it is actually an unsexed bird. In his table of measurements he records two specimens of *xyostictus*, a male (the type) and a female, but neither of the specimens bears any sex mark on the label. In other words, such slight size characters as he gives for these two races are based on purely arbitrary sexing and have no factual basis.

Three of the present examples show signs of molting in the wings; one of the males (U. S. N. M. No. 326819) is in the "gray" phase; the other specimens are in the "brown" phase.

The bird appears to be an addition to the known avifauna of Venezuela.

CHORDEILES ACUTIPENNIS ACUTIPENNIS (Hermann): ***South American Nighthawk***

Caprimulgus acutipennis HERMANN, Tabula affinitatum animalium, 1783, p. 230 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, San Carlos, Río Negro, January 28, 1931.
3 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 21–23, 1931.

Two of the males are rather small, having wings only 156 mm. long, while the third has a wing length of 166 mm. However, in their color characters all agree very closely, and the small birds are larger than the minimal measurements given by Oberholser in his account of this nighthawk (U. S. Nat. Mus. Bull. 86, 1914, p. 95).

NYCTIPROGNE LEUCOPYGA EXIGUA Friedmann: ***Northern Small-billed Nighthawk***

Nyctiprogne leucopyga exigua FRIEDMANN, Proc. Biol. Soc. Washington, vol. 58, 1945, p. 117 (right bank of Upper Orinoco, opposite Corocoro Island, Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 12, 1931.

Two of the males, one from each locality, were noted by the collectors as being in breeding condition.

This is the original series on which the description of *N. l. exigua* was based. The form is similar to the nominate one of the Amazon Valley but is smaller (wings 128.2–136.4 in *exigua* as against 139–142 in *leucopyga*) and darker, the upperparts with the blackish marks larger and with the pale buffy marks on the outer webs of the remiges and rectrices reduced in size and frequency. The known range of *exigua* is from the upper stretches of the Orinoco (opposite Corocoro Island) south to the northern part of the Brazo Casiquiare (at the mouth of the Río Pacila), extreme southern Venezuela.

NYCTIPROGNE LATIFASCIA Friedmann: ***Blackish Small-billed Nighthawk***

Nyctiprogne latifascia FRIEDMANN, Proc. Biol. Soc. Washington, vol. 58, 1945, p. 118 (Raudal Quirabuena, Brazo Casiquiare, Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, San Carlos, Río Negro, January 27, 1931.

4 ad. ♂, 2 ad. ♀, Venezuela, Raudal Quirabuena, Brazo Casiquiare, February 5, 1931.

Most of the specimens were in breeding condition when collected, according to the notes on their labels.

One of the males from Raudal Quirabuena is the type of this species, the whole series are paratypes. This nighthawk is similar to *Nyctiprogne leucopyga exigua* in size (males very slightly larger, the females more noticeably so), but the remiges and rectrices have no buffy transverse marks on their outer webs, the dark terminal area of the tail (from the white band to the tip of the tail) is much broader (47–51 mm. wide as against 30–40 mm. in *exigua* or typical *leucopyga*), and the coloration above and below is much darker, more blackish, less vermiculated with tawny-buff, the crown, occiput, and upper back being practically solid fuscous-black in *latifascia*.

This form is known only from extreme southern Venezuela, from San Carlos on the uppermost reaches of the Río Negro north to Raudal Quirabuena, on the Brazo Casiquiare. The present limits of the ranges of this bird and of *N. leucopyga exigua* are indeed difficult to explain except by the accident of collecting. As far as known there are no barriers to effect any spatial isolation between these birds and *exigua*, and it may well be that future collecting will find two to occur together. I know of no other case where two closely allied forms divide the Brazo Casiquiare between them. The whole, rather short extent of that stream seems to show no local variation in any of its birds.

An additional specimen from the Brazo Casiquiare, at Raudal Quirabuena, taken February 5, was preserved in alcohol.

PODAGER NACUNDA MINOR Cory: ***Northern Nacunda Nighthawk***

Podager nacunda minor CORY, Publ. Field Mus. Nat. Hist., Orn. Ser., vol. 1, 1915, p. 300 (Bôa Vista, Rio Branco, Brazil).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Isla Yagrumo, Río Negro, January 25, 1931.

This example has the small measurements of the northern race, to which, by geography, it should belong. It is in rather worn plumage.

LUROCALIS SEMITORQUATUS SEMITOROUATUS (Gmelin): ***Semicollared Nighthawk***

Caprimulgus semitorquatus GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 1031 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, San Carlos, Río Negro, January 28, 1931.

The single specimen obtained is in worn plumage, the feathers of the interscapular and upper back areas being particularly abraded.

NYCTIDROMUS ALBICOLLIS ALBICOLLIS (Gmelin): ***Cayenne Parauque***

Caprimulgus albicollis GMELIN, Systema naturae, vol. 1, 1789, p. 1030 (Cayenne).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 10–13, 1930.
1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 12, 1931.
3 ad. ♂, Venezuela, San Carlos, Río Negro, January 28.
1 ad. ♂, 1 ad. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 5–29, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 9–16, 1931.

Some of the specimens taken in January, February, and May were noted as having enlarged, active gonads when collected.

All the Venezuelan specimens are in the rufescent phase, the rufescent color being especially strong on the throat and upper breast. The most variable feature is the color of the crown, occiput, nape, and interscapulars, which varies from pale tawny in one male to sayal brown tinged with gray in another, and to light drab tinged with avellaneous in another.

The Brazilian examples include birds in both the gray and the rufescent phase. They average a little darker than the Venezuelan birds (comparing only birds in the same phase) and appear to constitute what may prove to be a recognizable local form. Unfortunately they appear to correspond to the characters of the Peruvian form *N. a. obscurus* Cory. Zimmer (Publ. Field Mus. Nat. Hist., Zool. Ser., vol. 17, 1930, p. 268), however, found that *obscurus* was not separable from *albicollis*. He had the type of *obscurus* available for study and found that there was "great variation in coloration throughout the series, with the two extremes of brown and sooty plumage quite different when compared with each other, but there are intermediates of every stage. The type of *obscurus* is a dark bird but it can be matched by specimens from near the type locality of *albicollis* while other Peruvian skins are as light in color as from

any other regions." The five Brazilian skins have been compared with specimens of *N. a. derbyanus*, with which they also disagree. It is possible that they represent an undescribed race, although how they differ from those individuals of *albicollis* that fit the description of *obscurus* is difficult to see.

CAPRIMULGUS NIGRESCENS NIGRESCENS Cabanis: ***Dark Nighthawk***

Caprimulgus nigrescens Cabanis, *in* Schomburgk, Reisen in Britisch-Guiana . . . ; pt. 3, 1848, p. 710 (Lower Essequibo River, British Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, October 31, 1930.
1 ad. ♀, Brazil, Rio Maturacá, November 8, 1930.
2 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, December 30, 1930–January 6, 1931.
1 ad. ♂, Venezuela, San Carlos, Río Negro, January 28, 1931.
1 ad. ♂, Venezuela, Puerto Ayacucho, Upper Orinoco, January 8, 1930.

The Puerto Ayacucho bird was in breeding condition when collected.

In the absence of adequate comparative material, we follow Peters (Check list of birds of the world, vol. 4, 1940, p. 202) in considering *C. n. duidae* Griscom and Greenway a synonym of this race, with, however, due notice of the fact that the two describers stick to their original conception of the races of this nighthawk in a paper subsequent to Peters' volume (Bull. Mus. Comp. Zool., vol. 88, 1941, pp. 164–165). If future work should uphold *duidae* the present series would have to be referred to it.

HYDROPSALIS CLIMACOCERCA SCHOMBURGKI Sclater: ***Schomburgk's Nighthawk***

Hydropsalis schomburgki "G. R. Gray" Sclater, Proc. Zool. Soc. London, 1866, p. 142 (British Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, Cachoeira Thomaz, October 26, 1930.
1 ad. ♀, Brazil, Rio Cauabury, below Cachoeira Destacamento, October 28, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Rio Cauabury, Cachoeira Destacamento, October 29 and December 14, 1930.
1 ad. ♀, Venezuela, Isla Yagrumo, Río Negro, January 25, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Santa Rosa, Río Negro, January 26, 1931.
1 ad. ♂, Venezuela, below San Carlos, Río Negro, January 27, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Raudal San Sebastián, February 1, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Perro de Agua, February 18, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Buenos Aires, February 21, 1931.

Most of the examples collected in January and February were noted as being in breeding condition.

This series varies very considerably, so much so, in fact, that one is led to wonder if possibly it may be a migratory species and that more than one race is here represented. The three males from

the Brazo Casiquiare are different enough from each other in dorsal paleness or duskiness to represent as many "races" of some nighthawk species. If they are all resident birds it is strange indeed that the same species should show such excessive local speciation on the Lower Amazon, where between Obidos and Santarém, an air-line distance of not over 75 miles, three races are currently recognized.

The six females show a rather unusual type of variation apparently wholly individual in character. Three of them have a single large transverse buffy spot on the inner webs of the outer remiges; the other two have three such markings and have them somewhat lengthened, producing on the successive remiges the appearance of two bands. These three specimens (one from the Rio Cauabury, one from Isla Yagrumo, and one from the Brazo Casiquiare, Upper Rio Negro) have the blackish streaks on the top of the head narrower than do the other three.

The female from Cachoeira Destacamento is considerably larger than the other examples, wing 155 as against 147–150; tail 123 as against 107–114 mm. in the others.

The male collected on February 1 at Raudal San Sebastián is in molt.

The present series constitutes an extension of the known range of this nighthawk southwestward to the Casiquiare and Río Negro in extreme southern Venezuela and also into adjacent parts of Brazil, to the avifauna of which country it appears to be an addition.

On December 14, 1930, at Cachoeira Destacamento, Amazonas, Brazil, Holt found and photographed a "nest" and two eggs of this bird.

Family NYCTIBIIDAE: Potoos

NYCTIBIUS GRANDIS (Gmelin): *Grand Potoo*

Caprimulgus grandis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 1029 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 7, 1930.

1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 8, 1931.

The Brazilian bird is in a much paler phase than is the Venezuelan example.

NYCTIBIUS GRISEUS GRISEUS (Gmelin): *Gray Potoo*

Caprimulgus griseus GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 1029, No. 5 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♀ Brazil, Serra Imeri, Rio Maturacá, near Salto do Huá, November 27, 1930.

This bird is in rather worn plumage.

Family APODIDAE: Swifts

CHAETURA SPINICAUDA AETHALEA Todd: ***Todd's Spine-tailed Swift***

Chaetura spinicauda aethalea Todd, Proc. Biol. Soc. Washington, vol. 50, 1937, p. 183 (Benevides, Pará, Brazil).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Chapazon, right bank of Brazo Casiquiare, January 30, 1931.

The lone example of this swift secured was noted as being in breeding condition when collected.

No material of *C. s. aethalea* has been available for comparison, but Dr. J. T. Zimmer has kindly compared this specimen with an example from the Tocantins in the American Museum of Natural History. He writes me that the two agree in all essential details although the sexes are different. The present bird is a trifle larger, but both are even more definitely larger than the average of *C. s. spinicauda;* although not much larger than the maximum extreme of that form. Both are distinctly darker on the underparts, both having a definitely whitish throat and both have more gray on the shorter upper tail coverts. Our specimen has the following dimensions: Wing 108, tail 40, culmen from base 5.5 mm.

This specimen extends the known range of the subspecies considerably to the north and constitutes an addition to the known avifauna of Venezuela.

AERONAUTES MONTIVAGUS TATEI (Chapman): ***Tate's Swift***

Duidia tatei Chapman, Amer. Mus. Nov., No. 380, 1929, p. 11 (High Point Camp, Mount Duida, Venezuela, 7,100 feet).

SPECIMENS COLLECTED

1 ad. ♀, 1 im. –, Brazil, Serra Imeri, near Salto do Huá, December 3–9, 1930.

These two specimens constitute a small southwestern extension of the known range of this swift and add it to the recorded avifauna of Brazil. Previously it was known only from Mount Duida and Mount Auyán-tepuí, although it probably occurs in the Guiana highlands as well. The present records are more remarkable in that they come from a lowland area; in other words they extend the known range of the bird more extensively altitudinally than geographically.

The immature bird is much darker, more blackish, less brownish above than the adult female, and it may be a male. The dimensions of the two are as follows: ad. ♀—wing 116, tail 41, culmen from base 7.5 mm.; immature unsexed—wing 113, tail 40, culmen from base 7.4 mm.

I am indebted to Dr. J. T. Zimmer for comparing these specimens with material of *tatei* in the American Museum of Natural History.

REINARDA SQUAMATA SEMOTA Riley: ***Riley's Swift***

Reinarda squamata semota RILEY, Proc. Biol. Soc. Washington, vol. 46, 1933, p. 39 (El Mango, Brazo Casiquiare, Venezuela).

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, 2 im. ♀, 1 –, Venezuela, El Mango, Brazo Casiquiare, February 5, 1931.

1 im. ♀, Venezuela, Brazo Casiquiare, near Caño Pamoni, February 19, 1931.

This is the original series that Riley had when he described *semota*. The adult female from El Mango is the type specimen.

Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, pp. 468–469) has found typical *squamata* to range from British Guiana westward to the lower Orinoco (Altagracia and Caicara) as well as to Mount Auyán-tepuí, Venezuela. Recently Rogers has examined the present examples and has compared them with specimens of *squamata* and concurs in finding *semota* a valid race.

Inasmuch as the race *semota* is still very rare in collections, it may be well to state its distinguishing characteristics. It differs from the nominate form in having the upperparts a shining greenish black instead of brownish black; in having a broader and darker pectoral band; and in having the feathers of the throat and center of the breast only fringed with white, with the dark basal parts of the feathers extensively exposed, and with the under tail coverts shining greenish black with only a very narrow white fringe on the inner web (instead of nearly all the inner web being white and the outer web narrowly edged with the same).

Peters (Check list of birds of the world, vol. 4, 1940, p. 255) writes that "birds recorded from eastern Peru may be referable here," while Riley (*cit. supra*) states that "the species has been recorded from Peru, but birds from there will almost certainly prove to be different from the more eastern birds."

Recently Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, p. 72) has indicated that a specimen from Manáos shows characters of *semota* while another from the same place is typical *squamata*, and suggests that this throws some doubt on the validity of *semota*. This is, however, slight evidence upon which to base a case against the Casiquiare race.

Family TROCHILIDAE: Hummingbirds

THRENETES LEUCURUS LEUCURUS (Linnaeus): ***White-tailed Barbed-throat***

Trochilus leucurus LINNAEUS, Systema naturae, ed. 2, vol. 1, 1766, p. 190 ("America Meridionale" = Surinam).

SPECIMENS COLLECTED

1 ad. ♂, 1 –, Brazil, São Gabriel, Rio Negro, December 29, 1930, January 3, 1931.

Cucuhy, Brazil, from the south.

The Cerro Yapacana, Upper Orinoco, Venezuela. This remarkable isolated mountain rises precipitously from the banks of the Orinoco. It has never yet been climbed and may well have undescribed kinds of birds on its higher parts.

The Casiquiare, looking out through the intake to the Orinoco, Venezuela.

The Casiquiare, looking downstream from Cerro Guanari, Venezuela.

The unsexed bird is immature and was molting into adult plumage when collected. It is much paler below than the adult male, and also is smaller; it may be a female.

As Gilliard has shown (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 469) that this bird occurs north to Mount Auyán-tepuí in Venezuela; so far it seems not to have been recorded from the Mount Duida–Upper Orinoco region).

GLAUCIS HIRSUTA HIRSUTA (Gmelin): ***Hairy Hermit***

Trochilus hirsutus GMELIN, Systema naturae, vol. 1, 1788, p. 490 (Brazil).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

The subspecific identification here used for this immature specimen is based on the usage of Pinto (Rev. Mus. Paulista, vol. 22, 1938, p. 248) and Todd (Annals Carnegie Mus., vol. 29, 1942, p. 275). Cory (Catalogue of the birds of the Americas, pt. 2, No. 1, 1918, p. 152) refers specimens from our area to *G. h. affinis*.

PHAETHORNIS SUPERCILIOSUS SUPERCILIOSUS (Linnaeus): ***Guiana Hermit***

Trochilus superciliosus LINNAEUS, Systema naturae, vol. 1, ed. 12, 1766, p. 189 ("Cayenne").

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♀, Brazil, São Gabriel, Rio Negro, December 29, 1930-January 1, 1931.

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.

4 ad. ♂, 1 ad. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 29–April 26, 1931.

Two of the Cerro Yapacana birds were noted as being in breeding condition when collected.

In the absence of adequate comparative material we accept Todd's conclusion (Ann. Carnegie Mus., vol. 29, 1942, p. 278) that *saturatior* Simon, described from the Upper Orinoco, is not distinct from *superciliosus*.

PHEATHORNIS BOURCIERI (Lesson): ***Bourcier's Hermit***

Trochilus bourcieri LESSON, Les Trochilidae, 1832, p. 62, pl. 18 ("Bresil" = Rio Tapajóz, Griscom and Greenway, Bull. Mus. Comp. Zool., vol. 88, 1941, p. 168).

SPECIMENS COLLECTED

1 im. –, Brazil, Rio Cauabury, below Cachoeira Thomaz, November 2, 1930.

1 –, Brazil, Salto do Huá, Rio Maturacá, November 24, 1930.

1 ad. ♂, Venezuela, Chapazon, right bank of Brazo Casiquiare, January 30, 1931.

1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 28, 1931.

The adult male was in breeding condition when collected.

The two unsexed birds appear to be females by plumage characters.

The genus *Ametrornis* proposed for this species because of its nearly straight bill seems too slightly characterized to be maintained as distinct from *Phaethornis*.

Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, pp. 168–169) consider the birds of the Guianas and Mount Duida as a different race, *whitelyi* Boucard, 1891, distinguished by its more uniformly pale mouse brown underparts. If this be maintained by further material, our Venezuelan birds, coming from fairly near to Mount Duida, would have to be considered *whitelyi*. The problem then would be to place the Brazilian specimens. They are not in plumage condition to allow for subspecific identification, but are less uniform below than are the Venezuelan birds. If the usual distributional pattern apply in this species the Upper Rio Negro population would be the same as the Upper Orinoco one. In that event *whitelyi* would include these northwestern Brazilian birds. Griscom and Greenway mention an intermediate example from Caquetá, Colombia, which would be in keeping with such an arrangement.

Apparently the only previous Brazilian records for the species are Natterer's one from Marabitanas on the Rio Negro, and a male from Caxiricatuba, Rio Tapajóz, listed by Griscom and Greenway. If we accept the restriction of the type locality to the Rio Tapajóz (why not make it Caxiricatuba to be more exact, while about it?) the range of the nominate form, if *whitelyi* were to be recognized, would be: the Tapajóz to the Lower Rio Negro and westward to eastern Ecuador and Peru; and *whitelyi* would extend from the Guianas to southern Venezuela and possibly to adjacent areas of the Upper Rio Negro in Brazil.

PHAETHORNIS RUBER EPISCOPUS Gould: ***Bishop Hermit***

Phaethornis episcopus Gould, Proc. Zool. Soc. London, 1857, p. 14 (Demerara, British Guiana).

SPECIMENS COLLECTED

1 im.—, Venezuela, Chapazon, right bank Brazo Casiquiare, January 30, 1931.
1 ad. ♀, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.
1 im. ♂, 1 im.—, Venezuela, Brazo Casiquiare below mouth of Río Pacila, February 13, 1931.
1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930.

The adult male was noted as being in breeding condition when collected.

The total comparative material available for study when identifying these specimens has been rather meagre, and the results arrived at by Hellmayr (Nov. Zool., vol. 14, 1907, pp. 75–76) have been followed as best fitting the material seen. The present examples are mostly in poor condition, making it impossible to study them very critically.

CAMPYLOPTERUS LARGIPENNIS (Boddaert:) ***Broad-shafted Saberwing***

Trochilus largipennis BODDAERT, Table des planches enluminéez . . . , 1783, p. 41 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, 1 ad. –, Brazil, Serra Imeri, Rio Maturacá, November 26–December 2, 1930.
1 ad. ♂, Venezuela, Chapazon, right bank Brazo Casiquiare, January 30, 1931.
1 im. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 13–28, 1931.

The unsexed bird from Serra Imeri differs from all the others in that it has a pale brown "horn-colored" mandible, not a blackish one. It seems not unlikely that *obscurus* and *aequatorialis* will prove to be conspecific with *largipennis;* in fact, they have been so considered by some authors, such as Berlioz, Griscom, and Greenway, although Todd, Pinto, and others keep them as specifically distinct.

FLORISUGA MELLIVORA MELLIVORA (Linnaeus): ***Jacobin Hummingbird***

Trochilus mellivorus LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 121 ("India," errore=Guiana, Brabourne and Chubb, The birds of South America, vol. 1, 1912, p. 111).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, Cachoeira Caranguejo, October 25, 1930.
1 im. ♀, Brazil, Rio Cauabury, Panela de Onca, November 1, 1930.
1 im. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare at mouth of Caño Atamoni, February 6, 1931.

The adult male was in breeding condition when shot. The immature bird taken on January 30 is nearly in adult plumage; the one collected on November 1 is entirely in juvenal dress.

AGYRTRINA VERSICOLOR MILLERII (Bourcier): ***Miller's Emerald***

Trochilus millerii Lodd; MSS. ined., BOURCIER, Proc. Zool. Soc. London, 1847, p. 43 (Rio Negro).

SPECIMENS COLLECTED

1 im. –, Venezuela, Solano, Brazo Casiquiare, February 2, 1931.
1 ad. ♂, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.
1 im. –, Venezuela, San Antonio, Upper Orinoco, March 5, 1931.
1 im. ♂, 1 –, Venezuela, Cerro Yapacana, Upper Orinoco, April 7–14, 1931.

The adult male was noted as being in breeding condition.

AGYRTRINA FIMBRIATA FIMBRIATA (Gmelin): ***Lesson's Emerald***

Trochilus fimbriatus GMELIN, Systema naturae, vol. 1, 1788, p. 493 (Cayenne).

SPECIMENS COLLECTED

1 ad. – (♀), Venezuela, Cerro Yapacana, Upper Orinoco, April 29, 1931.
1 ad. ♂, 1 ad. ♀, 1 im. ♀, 1 ad. – (♀), Venezuela, Puerto Ayacucho, Río Orinoco, May 8–19, 1931, and January 2, 1930.

These specimens agree with others from British Guiana.

No material of *apicalis* (Gould) has been available for direct comparison, but the close agreement of the present birds with examples from British Guiana suggests that *apicalis* is restricted to more western parts of Venezuela and eastern Colombia, and that the nominate race comes up from the south into the Upper Orinoco Valley.

SAUCEROTTIA TOBACI CAURENSIS Berlepsch and Hartert: ***Caura Valley Hummingbird***

Saucerottia erythronotus caurensis BERLEPSCH and HARTERT, Nov. Zool., vol. 9, 1902, p. 84 (Suapure, Caura River, Venezuela).

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, Venezuela, Ciudad Bolívar, June 8–10, 1931.

In the original description of this race specimens are listed from Ciudad Bolívar, which strengthens the identifications of the present examples from that locality.

HYLOCHARIS SAPPHIRINA (Gmelin): ***Guiana Sapphire***

Trochilus sapphirina GMELIN, Systema naturae, vol. 1, 1788, p. 496 (Guiana).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, Amazonas, October 2, 1930.
1 im, –, Brazil, San Carlos, Rio Negro, January 28, 1931.

This hummingbird ranges across the country traversed by the expedition but was met with only once, at Manáos.

HYLOCHARIS CYANUS VIRIDIVENTRIS Berlepsch: ***Green-vented Sapphire***

Hylocharis viridiventris BERLEPSCH, Ibis, 1880, p. 113 (Merida).

SPECIMENS COLLECTED

2 im. ♂, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.
2 im. ♂, 1 ad. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 16–23, 1931.

The two "immature" males from Cerro Yapacana were probably adult birds, as one of them was noted as having active, enlarged gonads, and both were in adult plumage. The Tamatama birds show signs of body molt.

CHLOROSTILBON CARIBAEUS Lawrence: ***Caribbean Emerald***

Chlorostilbon caribaeus LAWRENCE, Ann. Lyc. Nat. Hist. New York, vol. 10, 1874, p. 13 (Curaçao).

SPECIMENS COLLECTED

3 ad. ♂, 1 – (♀), Venezuela, Ciudad Bolívar, June 10, 1931.

Two of the males were noted by the collectors as being in breeding condition.

After comparison of a large series, including the specimens in the U. S. National Museum and the Carnegie Museum, Dr. Wetmore

informs me that he could see no differences between birds from the Orinoco region that had been separated as the subspecies *nanus* by Berlepsch and Hartert and those from northern Venezuela, including Curaçao. Todd previously came to the same conclusion. Simon's race *orinocensis* is likewise a synonym of *caribaeus*.

THALURANIA FURCATA FISSILIS Berlepsch and Hartert: ***Venezuelan Wood Nymph***

Thalurania furcata fissilis Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 87 (Caura River, Venezuela).

SPECIMENS COLLECTED

14 ad. ♂, 5 im. ♂, 9 ad. ♀, 2 im. ♀, 2 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 23, 1931.

According to Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 472) birds from Caicara, Suapure, Guanoco, Mount Auyán-tepuí and Mount Roraima, and from British Guiana are *fissilis*, and the race *orenocensis* Hellmayr, from Nericagua, differs from *fissilis* in having the crown lighter, more coppery green, less dusky green, and by having the iridescent band across the shoulders broader and richer, deeper purplish blue, less violet. Out of 14 adult males (and only the males show the subspecific characters) from Cerro Yapacana five would have to be called *orenocensis* and nine *fissilis* on these characters. Furthermore, as intimated under *T. f. nigrofasciata*, a few of them are hardly separable from that race. The extreme upper stretches of the Orinoco Basin seem to be the meeting place of *nigrofasciata* and *fissilis*, and the name *orenocensis* is based on the resulting conglomerate. It is considered most adequately treated as a synonym of *fissilis*. The intermediate nature of the *orenocensis* population is further suggested by the fact that years ago Hellmayr (Nov. Zool., vol. 14, 1907, p. 78) wrote that they closely resembled the Peruvian race *tschudii*.

THALURANIA FURCATA NIGROFASCIATA (Gould): ***Black-banded Wood Nymph***

Trochilus (– ?) *nigrofasciata* Gould, Proc. Zool. Soc. London, 1846, p. 89 (Rio Negro).

SPECIMENS COLLECTED

1 ad. ♂ (= ♀), 1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 3–8, 1930.

1 im. – (♂), Brazil, Cachoeira Manajó, Rio Cauabury, October 30, 1930.

1 im. ♂, 1 im. – (♀ ?), Brazil, Rio Cauabury, above mouth of Rio Já, November 4–5, 1930.

1 im. ♂, Brazil, Rio Cauabury, November 7, 1930.

1 – (♂), Brazil, Rio Maturacá, November 12, 1930.

2 ad. ♂ (1 = ♀), 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 14–26, 1930.

1 im. – (♂), 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, November 29–December 4, 1930.

1 ad. ♂, 1 im. ♂, Brazil, São Gabriel, Rio Negro, January 6, 1931.

1 im. ♀, Colombian bank of Río Negro opposite San Carlos, January 29, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.

1 im. (ad. ?) ♂, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

Some of the November and February birds were noted by the collectors as being in breeding condition.

The two birds from the Brazo Casiquiare and the one from San Antonio are the northernmost records for the race and appear to be the first ones from Venezuela as far as published records go. As is noted under the first form, a few of the males from as far north as Cerro Yapacana on the Upper Orinoco, here referred to *T. f. fissilis*, differ very slightly indeed from *nigrofasciata*. Their present allocation is due to the fact that the majority of the specimens from that locality are *fissilis*.

SMARAGDITES THERESIAE THERESIAE (Da Silva Maia): ***Goldenthroat***

Ornismya theresiae Da Silva Maia, Minerva Brasil, 1843, p. 2 (Pará).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Manáos, October 1, 1930.

The only example obtained is unfortunately in somewhat ruffled plumage and has a broken bill.

SMARAGDITES THERESIAE LEUCORRHOUS (Sclater and Salvin): ***White-vented Goldenthroat***

Polytmus leucorrhous Sclater and Salvin, Proc. Zool. Soc. London, 1867, p. 584 (Cobati, Rio Negro).

SPECIMENS COLLECTED

1 im. ♀, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.

3 ad. ♂, 2 im. ♂, 1 im –, Venezuela, Cerro Yapacana, Upper Orinoco, April 12–29, 1931.

These specimens appear to be the first ones recorded from Venezuela and constitute a sizable northward extension of the known range of the form. All have white under tail coverts (the nominate form, which ranges from the Guianas and lower Amazonia westward to eastern Venezuela, has these feathers greenish). The race was previously known from northwestern Brazil from the Upper Rio Negro west to eastern Peru.

HELIODOXA XANTHOGONYS Salvin and Godman: ***Yellow-cheeked Hummingbird***

Heliodoxa xanthogonys Salvin and Godman, Ibis, 1882, p. 80 (Merume Mountains).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 7, 1930.

I am indebted to Dr. J. T. Zimmer for the identification of this specimen.

This species is stated in literature to occur from British Guiana

west as far as southern Venezuela (Mount Duida); I have come across no previous record of it from Brazil.

HELIOTHRYX AURITA AURITA (Gmelin): ***Black-eared Fairy***

Trochilus auritus GMELIN, Systema naturae, vol. 1, pt. 1, 1788, p. 493 ("Cayenna").

SPECIMENS COLLECTED

1 ad. ♀, 1 ad. –, Brazil, Rio Maturaca, November 9, 1930.
1 im. ♂, Brazil, São Gabriel, Rio Negro, January 16, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 7, 1931.

Strangely enough, the adult male is the only one of the four specimens collected that lacks the long tail. The female and the young male have dusky flecks on the chin and throat, these flecks being larger and darker in the female.

DISCOSURA LONGICAUDA (Gmelin): ***Racket-tail***

Trochilus longicauda GMELIN, Systema naturae, vol. 1, 1788, p. 496 (Cayenne).

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 5, 1931.

This specimen lacks the long spatulate rackets on the tail. It also differs from adult birds in having the pale band across the lower back much more orange-tawny, less whitish. It was in process of getting the green goret when collected.

Family TROGONIDAE: Trogons

PHAROMACHRUS PAVONINUS PAVONINUS (Spix): ***Pavonine Trogon***

Trogon pavoninus SPIX, Avium species novae . . . Brasiliam . . ., vol. 1, 1825–1826, p. 47, pl. 35 ("in sylvis Tabatingue et Marabitanas," Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 9, 1931.
1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 14, 1930.
1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, December 1, 1930.

No material of *P. p. viridiceps* Griscom and Greenway has been available for comparison, but the present birds are clearly of the nominate race. Furthermore, Todd (Proc. Biol. Soc. Washington, vol. 56, 1943, p. 4) finds that *viridiceps* is of doubtful validity.

This trogon appears to be rather scarce in collections; it occurs in Upper Amazonia west to Colombia, eastern Ecuador, and Eastern Peru and north to the Upper Rio Negro. It has not been reported from the Upper Orinoco.

TROGON RUFUS RUFUS Gmelin: ***Yellow-bellied Trogon***

Trogon rufus GMELIN, Systema naturae, vol. 1, 1788, p. 404 (based on Daubenton, Planches enluminées . . . , p. 736: Cayenne).

SPECIMENS COLLECTED

3 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 21, 1930.

1 "ad." ♂ (=subadult), Venezuela, Brazo Casiquiare below mouth of Río Pacila, February 12, 1931.

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 18, 1931.

The literature of this species is confusing because of the divergent nomenclatural usages employed. The nomenclature here used is that adopted by Zimmer (Publ. Field Mus., Nat. Hist., Zool. Ser., vol. 17, 1930, p. 295–6) and Todd (Proc. Biol. Soc. Washington, vol. 56, 1943, p. 9) and not that of Hellmayr, Griscom and Greenway, Pinto, and others.

The male, although labeled as an adult, still has the cheeks, chin, throat, and breast as in the female plumage and is obviously a subadult bird.

One of the females has the outer rectrices much more abundantly barred, i. e., the white interspaces between the black bars narrower than the others. If they were not all from the same locality one would be inclined to see in it a possible racial character, as it is just the sort of variation that is so often subspecific.

The adult male collected on March 18 was in breeding condition when shot.

TROGON STRIGILATUS STRIGILATUS Linnaeus: ***Green-backed Trogon***

Trogon strigilatus Linnaeus, Systema naturae, ed. 12, 1766, p. 167 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 11, 1930.

1 im. ♂, Brazil, Rio Negro at mouth of Rio Cauabury, October 22, 1930.

1 ad. ♀, Brazil, Rio Maturacá, November 12, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 16, 1931.

1 im. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, below Playa de Candela, February 9, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.

2 ad. ♂, 1 im. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, February 28–March 2, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13–15, 1931.

8 ad. ♂, 2 im. ♂, 3 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 19–April 27, 1931.

1 ad. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930, and May 11–13, 1931.

Some of the February, March, and April birds were noted as being in breeding condition when collected. Signs of molt are to be found in birds collected in October and February.

This appears to be the commonest and most ubiquitously distributed of the trogons in the areas covered by the expedition.

A specimen taken on the Brazo Casiquiare below the Rio Pacila, February 13, was preserved in alcohol.

TROGON MELANURUS MELANURUS Swainson: ***Black-tailed Trogon***

Trogon melanurus Swainson, Animals in menageries, pt. 3, 1838, p. 329 (Demarara, British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Brazil, Salto do Huá, Rio Maturacá, November 22–26, 1930.

2 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, November 30–December 7, 1930.

1 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

3 ad. ♂, 1 im. ♂, 2 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 7–17, 1931.

The immature males have the three outer pairs of the rectrices tipped and externally barred with white. The two "immature" females are probably fully adult as they have adult rectrices.

In his notes on this species Todd (Proc. Biol. Soc. Washington, vol. 56, 1943, p. 5) records that the width of the white pectoral band is geographically variable, being narrow and even obsolete in Bolivian examples, but wide and well developed in specimens from both the Lower and the Upper Amazon. The present series of Upper Amazonian birds have this band quite well developed but in sufficiently varying degrees as to make one cautious in using the character for further splitting of the species.

TROGON VIOLACEUS RAMONIANUS Deville and Des Murs: ***Deville's Trogon***

Trogon ramonianus Deville and Des Murs, Rev. Zool., 1849, p. 331 (Sarayacu, eastern Peru).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below Río Pacila, February 11, 1931.

1 im. ♂, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.

1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 21, 1931.

As Todd has pointed out (Proc. Biol. Soc. Washington, vol. 56, 1943, p. 12) females of this subspecies cannot be distinguished from those of typical *violaceus*, but the males are identifiable by having the upper wing coverts and secondaries with little or no light vermiculations. Two of the males listed above have these feathers solid black; the third has very faint whitish vermiculations, which are noticeable only on close examination.

The limits of the range of *ramonianus* are still to be worked out. Thus, toward the east, Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 182) write that their specimens of *T. v. crissalis* from the Tapajóz, Rio Acará, and Benevides, all in lower Amazonia, "agree with *ramonianus*, and differ from the *violaceus-caligatus* series, in having the blackish, very minutely freckled wing-coverts. They differ from true *ramonianus* . . . in having smaller bills. This is

one of the characters assigned by Ridgway to *crissalis* . . . The character of the relative amount of freckling on the wing coverts is reversed in our specimens, so it is apparently worthless . . ." They write that there is no authentic record of the species south of the Amazonian drainage, but Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 292) records it from the Rio Guaporé, northern Matto Grosso. In the north, Hellmayr (Abh. Königl. Bay. Akad. Wiss., math.-phys. Kl., vol. 26, No. 2, 1912, pp. 61–62) writes that typical *violaceus* occurs in eastern Venezuela (Caura and Orinoco region). The present examples from San Antonio and Cerro Yapacana are indications that *ramonianus* and not *violaceus* is the form of the upper Orinoco at least. The subspecies appears to have been unrecorded previously from Venezuela.

Family ALCEDINIDAE: Kingfishers

MEGACERYLE TORQUATA TORQUATA (Linnaeus): ***Great-ringed Kingfisher***

Alcedo torquata Linnaeus, Systema naturae, ed. 12, 1766, p. 180 (Mexico).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Perro de Agua, February 18, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Pamoni, February 19, 1931.

The earlier of these two specimens shows signs of molt in the wings.

This large kingfisher ranges over a tremendous area from northern Mexico to Argentina.

CHLOROCERYLE AMAZONA AMAZONA (Latham): ***Amazon Kingfisher***

Alcedo amazona Latham, Index ornithologicus, vol. 1, 1790, p. 257 (Cayenne).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 7, 1930.

1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 19, 1931.

These specimens all have the white mark in front of the eye well developed. In the one male the wing measures 122 mm., and in three females it is 127, 132, and 132 mm., respectively.

CHLOROCERYLE AMERICANA AMERICANA (Gmelin): ***Green Kingfisher***

Alcedo americana Gmelin, Systema naturae, vol. 1, 1788, p. 451 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.

Like the other kingfishers, the present species occurs throughout the countries traversed by the expedition.

CHLOROCERYLE INDA (Linnaeus): ***Green and Rufous Kingfisher***

Alcedo inda LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 179 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cucuhy, Rio Negro, February 7, 1930.
1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 19, 1930.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 2, 1931.

The November bird shows signs of molt.

CHLOROCERYLE AENEA AENEA (Pallas): ***Least Green Kingfisher***

Alcedo aenea PALLAS, *in* Vroeg's Catalogus: Adumbratiunculae, vol. 1, 1764, No. 54 (Surinam).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 9, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.
1 ad. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 4–27, 1931.

Immaturity in this species is indicated by a brownish wash on the upper surface and by an increase in the amount of light markings on the webs of the secondaries and inner primaries. This must be taken into account in comparing specimens, as immature examples of true *aenea* show a fair amount of the light wing spotting and so suggest the northern form *stictoptera*, which is marked mainly by the presence of light marks across the secondaries and inner primaries.

The typical race ranges north through Panama to the Canal Zone and beyond. The northern form comes south from Mexico through Central America into northern Costa Rica, intergradation between the two apparently taking place in central and southern Costa Rica.

Family MOMOTIDAE: Motmots

MOMOTUS MOMOTA MOMOTA (Linnaeus): ***Common Motmot***

Ramphastos momota LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 152 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cachoeira Thomaz, Rio Cauabury, October 26, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 16, 1931.
1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 19, 1930.
1 ad. –, Brazil, Serra Imeri, near Salto do Huá, November 30, 1930.
1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 9, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Durutumoni, February 19, 1931.
7 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 1–21, 1931.

The Cerro Yapacana specimens are mostly in fresh plumage; six of the nine do not have the webs of the rectrices worn away to form the terminal rackets. There is a great deal of purely individual variation in color, some birds being very brownish green on the breast and abdomen while others have no brownish admixture at all.

Family GALBULIDAE: Jacamars

UROGALBA DEA DEA (Linnaeus): *Paradise Jacamar*

Alcedo dea LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 116 (Surinam).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, October 1, 1930.

1 ad. ♂, 1 im. –, Venezuela, Brazo Casiquiare, Chapazon, right bank, January 31, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Río Pacila, February 13, 1931.

2 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 1–3, 1931.

1 ad. ♂, Venezuela, right bank Upper Orinoco, opposite Corocoro Island, March 13, 1931.

Two of the January and one of the March birds show signs of molt.

The nominate race of this jacamar occurs eastward along the north bank of the Amazon at least as far as Obidos, whence Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 186) record 10 specimens. No specimens of *U. d. brunneiceps* Todd have been available for study, but while Todd gives the range of *brunneiceps* as the "north bank of the Amazon, from the Rio Negro west to Peru, and on the south bank between the Rio Madeira and the Rio Tapajoz" (Ann. Carnegie Mus., vol. 30, 1943, p. 6) he assigns Manáos examples to the nominate race (p. 4) on the basis of Hellmayr's notes (Nov. Zool., vol. 14, 1907, p. 27).

GALBULA GALBULA (Linnaeus): *Common Jacamar*

Alcedo galbula LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 182 ("Brasilia, Cayania" = Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below Playa de Candela, February 9, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 10, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11–12, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.

1 ad. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.

3 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 12–14, 1931.

Several of the specimens were noted as being in breeding condition when collected.

GALBULA RUFICAUDA RUFICAUDA Cuvier: *Rufous-tailed Jacamar*

Galbula ruficauda CUVIER, Règne animal, vol. 1, 1817, p. 420 ("Colombia").

SPECIMENS COLLECTED

2 ad. ♂, 2 ad. ♀, Venezuela, Soledad, Anzoátegui, December 10, 1929, and June 11, 1931.

One of the males is large, about the maximum size for the form; it measures: wing 84.2, tail 120, culmen from base 60.7, tarsus 15.3 mm.

GALBULA LEUCOGASTRA LEUCOGASTRA Vieillot: *White-bellied Jacamar*

Galbula leucogastra VIEILLOT, Nouv. Dict. Hist. Nat., vol. 16, 1817, p. 444 ("Amerique meridionale" = Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 3, 1930.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 15, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 10, 1931.

The April bird shows signs of molt.

GALBULA ALBIROSTRIS ALBIROSTRIS Latham: *White-billed Jacamar*

Galbula albirostris LATHAM, Index ornithologicus, vol. 1, 1790, p. 245 ("America Austral" = Cayenne).

SPECIMENS COLLECTED

5 ad. ♂, 2 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–23, 1931.

The immature female resembles the adults.

The extreme Upper Orinoco and northernmost reaches of the Upper Rio Negro seem to be the meeting place of this race and of the southern form with the completely dusky maxilla, *chalcocephala*. As may be noted under the discussion of the latter, we have a perfectly typical example from the Upper Orinoco near Isla Temblador, the northernmost record for *chalcocephala*, while Hellmayr (Nov. Zool., vol. 14, 1907, p. 36) writes that two females from Barra do Rio Negro (Wallace and Natterer coll.) showed all the characters of typical *albirostris* but were smaller in size. Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 303) gives these as the southernmost limits of *albirostris* on the basis of Hellmayr's statement.

GALBULA ALBIROSTRIS CHALCOCEPHALA Deville: *Bronze-headed Jacamar*

Galbula chalcocephela DEVILLE, Rev. et Mag. Zool., 1849, p. 55 (Sarayacu, Ecuador).

SPECIMENS COLLECTED

1 ad.–(♀), Brazil, Camanãos, December 23, 1930.
1 im. ♀, Brazil, Cucuhy, Rio Negro, February 5, 1930.
2 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 14–19, 1930.
1 ad. ♂, 1 ad.–(♂), Brazil, Serra Imeri, near Salto do Huá, December 4, 1930.
1 ad. ♂, Venezuela, Upper Orinoco near Isla Temblador, February 25, 1931.

The Orinoco example is the first one of this race to be recorded from Venezuela. It is darker brown on the breast and has a longer bill than any of the others but agrees in both respects very closely with Ecuadorian (typical) *chalcocephala*. The smaller bill size in the present Rio Negro birds is hardly significant, as there is so much variation even in this small series.

JACAMEROPS AUREA RIDGWAYI Todd: *Amazonian Great Jacamar*

Jacamerops aurea ridgwayi Todd, Ann. Carnegie Mus., vol. 30, 1943, p. 2 (Miriti-tuba, Rio Tapajóz, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cucuhy, Rio Negro, February 6, 1930.
1 ad. ♂, 3 ad. ♀, 1 im. ♀, Brazil, São Gabriel, Rio Negro, January 6–14, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 3–17, 1931.

Todd's revision of this species (*cit. supra*, pp. 1–3) has been found to hold for the total material in the U. S. National Museum, although, as might be expected, characters of iridescent colors are only average ones. The present series agrees with *ridgwayi* and not with typical examples of *aurea* from Demerara, and constitutes a northwestern extension of the known range of the race into the Upper Río Negro and the Upper Orinoco Valley in southern Venezuela.

One of the females from São Gabriel was in breeding condition when collected.

The immature female is very much more pinkisb purple, less green on the back than are any of the adults. It also has the superciliaries, sides of head, chin, and malar area more pinkish purple, less green, than any of the others.

Family BUCCONIDAE: Puffbirds

BUCCO CAPENSIS Linnaeus: *Collared Puffbird*

Bucco capensis Linnaeus, Systema naturae, vol 1, 1766, p. 168 (Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.
1 ad. ♂, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.
1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 22–April 25, 1931.

One of the Cerro Yapacana birds was in molt when collected.

This is one of the many birds that ranges unchanged from the Amazonian (Rio Negro) drainage basin into that of the Orinoco.

The Panela de Onca bird is not fully adult; it has the feathers of the auricular area and the area immediately behind it barred with blackish.

NOTHARCHUS MACRORHYNCHOS HYPERRHYNCHUS (Sclater): *Bonaparte's Puffbird*

Bucco hyperrhynchus Sclater, Proc. Zool. Soc. London, 1855, p. 193, pl. 105 (Upper Amazons).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 2, 1930.

Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 308) considers the Rio Negro birds *giganteus* (Pelzeln), but the material examined in the present study and the data in the literature suggest that *giganteus* is

not recognizable as distinct from *hyperrhynchus*. In considering *hyperrhynchus* a race of *macrorhynchos*, I am following the arrangement of Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 189), but it must be pointed out that the last word on the subject is yet to be said. Pinto records typical *macrorhynchos* as well as *N. hyperrhynchus giganteus* from the Rio Negro! Certainly the present example, with a broad white frontal area extending backward to the middle of the eye, is clearly *hyperrhynchus* and not typical *macrorhynchos*.

NOTHARCHUS ORDII (Cassin): ***Ord's Puffbird***

Bucco ordii CASSIN, Proc. Acad. Nat. Sci. Philadelphia, vol. 5, 1851, p. 154, pl. 8 (Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 3, 1930.
3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 21–24, 1931.

The April birds show signs of molt, especially in the rectrices.

Although Venezuela was given as the type locality in the original description of this puffbird, there appear to be no published records of its occurrence in that country, although other specimens have been collected there; the American Museum of Natural History, for example, has examples from the base of Mount Duida. Because of the lack of Venezuelan records in print Cory (Catalogue of the birds of the Americas, vol. 2, No. 2, 1919, p. 393) questioned the inclusion of Venezuela in the range, and Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 308) gives the type locality as "Venezuela, *errore*." Possibly because of the doubt as to the Venezuelan distribution of the bird, Stone (Proc. Acad. Nat. Sci. Philadelphia, 1899, p. 33) in his catalog of the bird types in the Philadelphia collection gives the type locality as Rio Negro and makes no mention of the original description given by Ord. In answer to my request, Mr. de Schauensee has reexamined the type specimen and informs me that it has an original label marked "no. 27. Bucco sp.? *Bucco ordii* Cassin Rio Negro (Venezuela)."

One of the Cerro Yapacana specimens appears to be younger than the other two, as it has the upper parts more brownish and the scapulars and upper wing coverts tipped with pale tawny-buff. It also has the brown pectoral band slightly darker than the other two but agrees in this respect with the Cucuhy adult. It is possible that more extensive series may reveal that the Upper Orinoco birds are separable from those of the Rio Negro in having the brown pectoral band slightly paler in the adult plumage. A bird from "Cayenne ?" is pale like the birds from the Upper Orinoco, but one from Playa del Río, at the base of Mount Duida, is almost as dark as our Cucuhy, Rio Negro, example.

NYSTACTES TAMATIA TAMATIA (Gmelin): *Cayenne Spotted Puffbird*

Bucco tamatia GMELIN, Systema naturae, vol. 1, 1788, p. 405 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, San Antonio, March 1–5, 1931.

3 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, Cerro Yapacana, April 5–27, 1931.

Some of the April birds were in breeding condition when collected. All the present specimens are in worn plumage; the March birds from San Antonio are extremely abraded.

Todd (Ann. Carnegie Mus., vol. 30, 1943, pp. 13–14) has recently studied the geographic variations of this species with results with which the material seen in the present connection is in good agreement. This material has been limited to two races—*tamatia* and *hypnaleus*.

HYPNELUS BICINCTUS BICINCTUS (Gould): *Two-banded Puffbird*

Tamatia bicincta GOULD, Proc. Zool. Soc. London, 1836, p. 80 ("Cayenne"= Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♂, 1 ad. ♀, Venezuela, Río Orinoco, Puerto Ayacucho, January 3–6, 1930, and May 11–19, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Soledad, Anzoátegui, November 29, December 4, 1929.

The immature bird has the tail little more than half grown.

NONNULA RUBECULA DUIDAE Chapman: *Duida Nonnula*

Nonnula duidae CHAPMAN, Bull. Amer. Mus. Nat. Hist., vol. 33, 1914, p. 195 (foot of Mount Duida, atlitude 700 feet, southern Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.

4 ad. ♂, 1 ad. – ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 23–28, 1931.

Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 315) considers birds from the Rio Negro as *N. r. cineracea*, but it would seem that they are better referred to *duidae*. Todd (Ann. Carnegie Mus., vol. 30, 1943, p. 18) has extended the known range of *duidae* south to Tonantins on the north bank of the Amazon.

MONASA ATRA (Boddaert): *Black Nunbird*

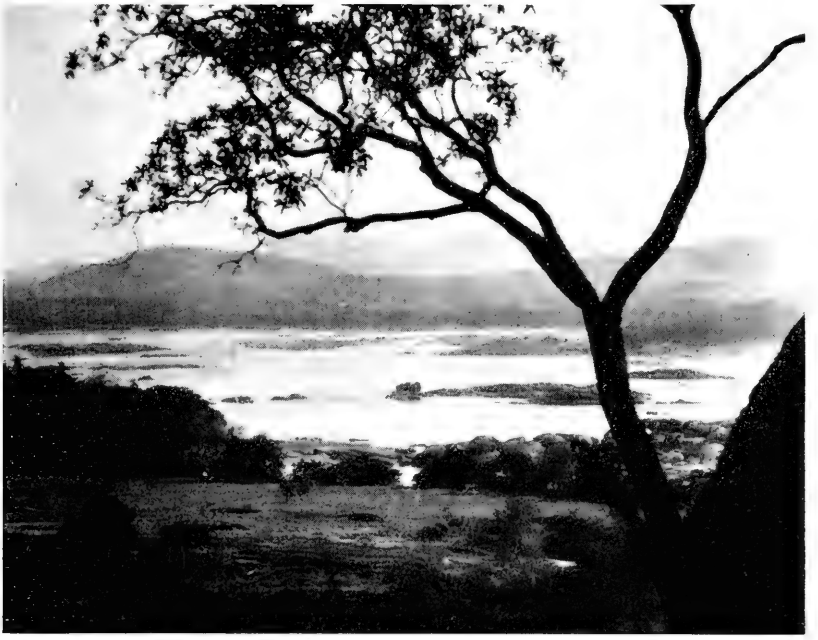
Cuculus niger BODDAERT, Table des planches enluminéez . . ., 1783, p. 30 (Cayenne).

SPECIMENS COLLECTED

2 ad. ♂, Brazil, Rio Cauabury, November 6–7, 1930.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 9, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila February 11, 1931.



Atures Rapids, Río Orinoco, above Puerto Ayacucho, Venezuela.

Puerto Ayacucho, Venezuela.

San Fernando de Atabapo, Río Orinoco, Venezuela.

Soledad, Venezuela.

1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.
6 ad. ♂, 6 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 28-April 27, 1931.
1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 8, 1930.

Several of the Cerro Yapacana birds were noted as being in breeding condition; one of the females had an egg ready for the shell in its oviduct.

Collin and Hartert (Nov. Zool., vol. 34, 1927, p. 51) consider that Boddaert's name *atra*, 1783, should be used for this bird, as *Cuculus niger* Müller, 1776, is preoccupied by *Cuculus niger* Linnaeus, 1758. This has been accepted by Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 317) but has not been followed by Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 475).

This bird has been recorded from the Rio Negro, but it must be a relatively scarce bird there in contrast to the Casiquiare and the Upper Orinoco.

MONASA MORPHOEUS PERUANA Sclater: ***Peruvian White-bearded Nunbird***

Monasa peruana SCLATER, Proc. Zool. Soc. London, 1855, p. 194 (Chamicuros, eastern Perú).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Rio Maturacá, November 9, 1930.

The present specimen is from the extreme northeastern limit of the range of the subspecies. Judged by the few records in literature, it would seem to be an uncommon bird in the Rio Negro area.

CHELIDOPTERA TENEBROSA TENEBROSA (Pallas): ***Swallow-wing***

Cuculus tenebrosus PALLAS, Neue Nord. Beytr., vol. 3, 1782, p. 3 (Surinam).

SPECIMENS COLLECTED

1 ad. ♂, 2 ad. ♀, Brazil, Manáos, September 26–30, 1930.
1 im. ♂, Brazil, Barcellos, Rio Negro, October 6, 1930.
1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 17, 1930.
1 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, December 29, 1930–January 3, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 31, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 14, 1931.
1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 27, 1931.
1 ad. ♂, 1 im. ♂, 1 ad. ♀, 1 ad.–, Venezuela, Puerto Ayacucho, Río Orinoco, May 16–19, 1931, and January 6, 1930.

Immature birds resemble the adults.

One of the January birds shows signs of molt.

This form occurs from the Guianas and eastern Colombia south to northern Brazil and Amazonian Peru. In the coastal area of northwestern Venezuela the birds are paler gray on the midabdomen and

have the gray anterior and the brown posterior abdominal areas separated by a whitish band. A few of the present specimens vaguely suggest such a band but are nearer to typical *tenebrosa* than to the coastal race *pallida*. A slightly larger, pale-bellied race, *brasiliensis*, occurs in southeastern Brazil.

A set of two eggs was collected at Chapazon, January 31, 1931.

Family CAPITONIDAE: Barbets

CAPITO AURATUS AURANTIICINCTUS Delmas: *Yellow-throated Barbet*

Capito aurantiicinctus DELMAS, Bull. Soc. Zool. France, 1900, p. 178 (Caura River, Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, Raudal Corocoro, below Playa de Candela, February 9, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12–13, 1931.

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 5, 1931.

9 ad. ♂, 3 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 29–April 24, 1931.

The southward limit of the range of this race is unknown. It must be rare, if not absent, on the Upper Rio Negro, or the expeditions would have collected some specimens, judged by the fine series they took farther north. Pinto (Rev. Mus. Paulista, vol. 22, 1937, pp. 321) records *aurantiicinctus* from Barcellos, Río Negro, with a query as to whether the specimen collected there by Natterer may not really have been *C. a. hypochondriacus* Chapman, which ranges to the Lower Rio Negro. Judged by our present series from São Gabriel southward to Santa Isabel, it would certainly seem that Barcellos birds would be not *hypochondriacus* but *transilens*.

From the specimens studied and from the literature it seems that *intermedius* Berlepsch and Hartert is not separable from *aurantiicinctus*. If the two were to be recognized the present series, while partly from the range of each, would have to be called *intermedius*, as none of the birds have any orange or cadmium edgings on the feathers of the rump or flanks.

CAPITO AURATUS TRANSILENS Friedmann: *Rio Negro Red-throated Barbet*

Capito auratus transilens FRIEDMANN, Proc. Biol. Soc. Washington, vol. 58, 1945, p. 113 (Santa Isabel, Rio Negro, Amazonas, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 16, 1930.

1 ad. ♂, Brazil, Rio Negro at mouth of Rio Cauabury, October 22, 1930.

2 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 2–3, 1931.

As pointed out in the original description of this form, the combination of its characters and its range support the assumed mutational origin of the subspecies of this barbet as suggested by Chapman (Amer. Mus. Nov., No. 335, 1928). It is a scarlet-throated race, nearest to *amazonicus*, but comes from an area between two yellow-throated forms, *aurantiicinctus* to the north of it and *hypochondriacus* to the south of it. It differs from *amazonicus*, Tefe on the Amazon, in having the forehead and crown more streaked and suffused with ochraceous-orange to xanthine orange, less yellowish, and with the two large yellowish stripes on the interscapulars and upper back primuline to light cadmium yellow, as opposed to strontian to lemon yellow in *amazonicus*, and the sides and flanks more heavily flecked with blackish. Females of the two races are very similar to each other.

Chapman found that his series of topotypical *auratus* from the Ucayali varied greatly, in fact so extensively as to include birds that matched examples of *amazonicus* as well. According to information received from Dr. J. T. Zimmer this series seems to cover the range of variation in the Rio Negro birds (*transilens*) but part of this may be an approach to the orange-throated form *novaolindae*. However unstable *auratus* may be in its terra typica, there is no such variability in the Rio Negro series. It seems possible that further material and study may indicate that *auratus* is merely an intermediate group between *transilens*, *amazonicus*, and *novaolindae* and not a fixed race.

Pinto (Rev. Mus. Paulista, vol. 23, 1938, p. 511) has recorded specimens of this barbet from São Gabriel and Taracuá as *C. a. nitidior*.

Family RAMPHASTIDAE: Toucans

RAMPHASTOS TUCANUS CUVIERI Wagler: *Cuvier's Toucan*

Ramphastos cuvieri WAGLER, Systema avium, Ramphastidae, 1827, p. 5 (Amazon River region, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 2 ad. ♀, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 7, 1930.

1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 18, 1930.

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 4, 1930.

1 ad. ♀, Venezuela, Brazo Casiquiare, February 6, 1931.

Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 81, 1937, pp. 427–430) have reviewed the present and closely allied toucans in what seems to be a satisfactory arrangement, which is here followed, although the dissenting comments of Todd's paper (Proc. Biol. Soc. Washington, vol. 56, 1943, pp. 155–157) and of Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, pp. 112–113) have been duly considered. The species name *tucanus* is apparently the correct one rather than *monilis*.

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The Brazo Casiquiare bird is a typical *cuvieri;* it shows no approach to *tucanus,* thereby agreeing with what Todd found for Duida birds and differing from the observations of Griscom and Greenway on south Venezuelan specimens.

Two examples collected at Playa de Candela, Brazo Casiquiare, February 8, 1931, were preserved in alcohol.

RAMPHASTOS VITELLINUS CULMINATUS Gould: ***Culminated Toucan***

Ramphastos culminatus GOULD, Proc. Zool. Soc. London, 1833, p. 70 (Mexico= Rio Solimões, Brazil, Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 101).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 18, 1930.
1 ad. ♂, 1 im. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 14, 1931.

The January birds were all in molt when collected.

The color of the lower throat is so variable in these four birds that it makes one wonder as to its reliability as a taxonomic character in other forms of the group. The adult male from São Gabriel has the lower throat pure white; the female from there has a small area of lemon yellow there; the immature male from the same locality has a much more extensive area colored lemon yellow; while the Salto do Huá bird has this area strongly suffused with cadmium yellow on a lemon-yellow background. It also has the red pectoral band broader than in any of the others and fits the description of *Ramphastos osculans* Gould. Todd, the most recent author to have investigated the status of *osculans* (Proc. Biol. Soc. Washington, vol. 56, 1943, p. 160) considers the name to be based on hybrids between *R. culminatus* and *R. vitellinus.* However, inasmuch as both of the latter are considered here, as by other writers, to be conspecific, this "hybrid" character may eventually prove to be racial, and to occupy a range between the other two races.

PTEROGLOSSUS FLAVIROSTRIS FLAVIROSTRIS Fraser: ***Yellow-billed Aracari***

Pteroglossus flavirostris FRASER, Proc. Zool. Soc. London, 1840, p. 61 ("Rio Janeiro").

SPECIMENS COLLECTED

2 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, January 5–12, 1931.
3 ad. ♂, 6 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 20–April 19, 1931.

Several of the specimens from both localities were noted as being in breeding condition when collected.

On the average the Venezuelan birds have longer bills than do the Rio Negro examples, although in their other dimensions they are alike. Thus, the two Brazilian females have bills of 72 and 76.2 mm., while the six Venezuelan ones have bills of 75.2, 81, 82, 86.1, 86.2, and 87.3 mm., respectively. In the males the difference is less marked,

the two Brazilian specimens having bills of 92 and 93.2 mm., while in the Venezuelan birds the bills measure 89.1, 94.4, and 97.3 mm.

PTEROGLOSSUS PLURICINCTUS Gould: ***Many-banded Aracari***

Pteroglossus pluricinctus Gould, Proc. Zool. Soc. London, 1835, p. 157 ("Brasilia").

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 3, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 6–24, 1931.

The male has the occiput and nape and upper wing coverts and the outer webs of the outer primaries much tinged with dark brownish and is probably subadult. It is in extremely abraded plumage. The two females show no brownish on the auriculars.

SELENIDERA NATTERERI (Gould): ***Natterer's Toucanet***

Pteroglossus nattereri Gould, Proc. Zool. Soc. London, 1835, p. 157 ("Brasilia").

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 8, 1930.
3 ad. ♂, 1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–26, 1931.

Todd has recently (Proc. Biol. Soc. Washington, vol. 56, 1943, p. 162) recorded this toucanet from Tonantins, on the upper Amazon, a new southern limit for the known range of the species. Apparently of local distribution throughout its range, this bird has been collected rather seldom and so has remained a scarce bird in museums.

The immature male is in a state of molt; the rectrices are only partly grown, and large areas of the sides and flanks and the center of the breast are bare. The plumage is identical in color and pattern with that of the adult, and the bill has the adult pattern as well.

Family PICIDAE: Woodpeckers

CENTURUS RUBRICAPILLUS RUBRICAPILLUS Cabanis: ***Red-crowned Woodpecker***

Centurus rubricapillus Cabanis, Journ. für Orn., vol. 10, 1862, p. 328 (Barranquilla, Colombia).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, 1 ad. ♀, 1 im. ♀, 1 im. –, Venezuela, Puerto Ayacucho, Río Orinoco, May 9–21, 1931.
1 im. ♂, Venezuela, Soledad, Anzoátegui, December 7, 1929.

The immature female, taken on May 19, had "active gonads," according to the collector.

TRIPSURUS CRUENTATUS EXTENSUS Todd: ***Multicolored Woodpecker***

Tripsurus cruentatus extensus Todd, Ann. Carnegie Mus., vol. 25, 1937, p. 251 (Arimá, Rio Purús, Brazil).

SPECIMENS COLLECTED

2 ad. ♂, ♀, 1 Brazil, Santa Isabel, Rio Negro, October 9–17, 1930.
4 ad. ♂, ♀, 3 ad. Brazil, São Gabriel, Rio Negro, January 9–14, 1931.

As Todd says in his description of this race, it is a poorly marked form, discernible only in series. The size of the red ventral patch is a character that is too easily affected by the "make" of the skin to

be one of great reliability, and the variations of the present material in this regard are not inconsiderable. It is possible that longer and more complete series from all parts of the range of the species may indicate the existence of an unnamed western race (Colombia to Peru) in which the whitish bars on the inner webs of the inner primaries are broader than in Amazonian ones.

Rio Negro birds are very variable in size, thus, two extreme males from São Gabriel have the following dimensions: Wing 109.2–120; culmen from base 26.3–28.4 mm.

One of the males may be not quite fully adult. It has only a few reddish specks on the crown instead of a solid patch of that color, which it may be in process of acquiring. If this is the case, then it would seem that the presence of the pale yellowish superciliaries and nape markings (which are fully developed in this specimen, and which are also present in females) may be more basic phylogenetically than the red patch. This, in turn, would suggest that they constitute a real, trenchant specific character and that, therefore, their absence in the otherwise similar *T. rubrifrons* is indicative of full specific distinction. Todd (*cit. supra*) records intermediate specimens, some with no superciliaries or only incomplete ones, others without the nuchal collar. These he interprets as possible hybrids between *cruentatus* and *rubrifrons*. Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, pp. 201, 202) incline to the belief that "*rubrifrons* is an imaginary species, a mere color phase of *cruentatus*, which is losing its white postocular and yellow nuchal collar in the northeastern part of its range. The chief arguments against the hybrid theory are that there is no region where only *rubrifrons* occurs, and its characters are purely negative."

An additional specimen from São Gabriel, January 12, 1931, was preserved in alcohol.

PICULUS CHRYSOCHLORUS CAPISTRATUS (Malherbe): ***Bonaparte's Green Woodpecker***

Chloropicus capistratus MALHERBE, Monographie des Picidées, vol. 2, 1862, p. 140, pl. 83 ("Bresil"=Rio Negro).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, above mouth of Rio Já, November 5, 1930.
1 ad. ♀, Brazil, mouth of Rio Maturacá, November 8, 1930.
2 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 11–27, 1931.

The two Cerro Yapacana birds are sufficiently dissimilar to indicate a wide range of individual variation, which, in turn, causes one to wonder at the wisdom of describing races of this species on single specimens such as Todd's *P. c. guianensis*. He described this form from French Guiana as differing from *capistratus* in being "darker colored throughout, the upper parts and wings externally near olive

green (instead of dark citrine); the sides of the head (postocular region) olivaceous black . . ., mystacal stripe dull olive green . . . and the barring of the under parts darker (dark greenish olive to blackish) . . ." This description practically fits the differences between the two Cerro Yapacana specimens.

As far as available data indicate, this bird has not been recorded before from the Orinoco Basin of southern Venezuela.

PICULUS FLAVIGULA FLAVIGULA (Boddaert): *Yellow-throated Green Woodpecker*

Picus flavigula BODDAERT, Table des planches enluminéez . . ., 1783, p. 49 (Cayenne).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 2–7, 1930.
1 ad. (♂), Brazil, Cachoeira Manajó, Rio Cauabury, October 30, 1930.
1 im. ♂, Brazil, Rio Cauabury, above mouth of Rio Já, November 5, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Rio Maturacá, Salto do Huá, November 14–22, 1930.
1 im. ♀ (= ♂), Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 25, 1931.

Two of the February birds and one of the April ones show signs of molting in the tail and wings and body plumage.

This series presents some variations that can better be recorded than explained at the present time. Males vary in the amount of red on the gular area but never seem to have a really well developed band there. One from Cucuhy (labeled ♀, but with the whole forehead, crown, and occiput red) has none; the immature male from the Rio Cauabury has a faint trace; the other Cucuhy male has a better-defined short gular band; the Cachoeira Manajó example has just a trace. The color of the lower back and rump of the females varies from dark greenish olive to old gold. The two Cucuhy males have very dissimilar bills, one having a culmen length (from base) of 24, the other of 21 mm., although the wing and tail lengths are about the same in both.

Two additional specimens, now preserved in alcohol, were taken, one at São Gabriel, and one on the Brazo Casiquiary below the mouth of the Río Pacila.

CHRYSOPTILUS PUNCTIGULA PUNCTIPECTUS Cabanis and Heine: *Spot-breasted Woodpecker*

Chrysoptilus punctipectus CABANIS and HEINE, Museum Heineanum, vol. 4, 1863, p. 163 (Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, 4 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 3, 1930 and May 8–15, 1931.

One of the May birds was in breeding condition when collected. Though these specimens have been labeled *punctipectus*, it is possible that with more material a distinct race may be segregated in this interior area. The birds listed have the spots on the lower surface small, one bird being nearly immaculate. The throat also is blacker than the average in *punctipectus*, resembling *guttatus*. The races of this bird will be understood only when more material is available. Dr. Wetmore has examined the series in the Chicago Natural History Museum and the American Museum of Natural History, in addition to the specimens in Washington, but found these collections too poor in material from the Orinoco and Amazon Basins to allow any definite conclusions as to the form inhabiting this area.

CELEUS JUMANA JUMANA (Spix): ***Spix's Amazonian Woodpecker***

Picus jumana Spix, Avium species novae . . . Braziliam . . . , vol. 1, 1824, p. 57, pl. 47 ("in sylvis flum. Amazonum").

SPECIMENS COLLECTED

2 ad. ♂, Brazil, São Gabriel, Rio Negro, December 29, 1930–January 5, 1931.

1 ad. ♂, Brazil, Rio Maturacá, November 9, 1930.

1 ad. ♂, 2 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 17–19, 1930.

2 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, November 29–December 4, 1930.

1 ad. ♂, Venezuela, Brazo Casiquiare, Chapazon, January 31, 1931.

1 –, Venezuela, Brazo Casiquiare, Solano, February 2, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 1–3, 1931.

1 ad. ♂, one ad. ♀, Venezuela, Upper Orinoco, right bank, opposite Corocoro Island, March 14–15, 1931.

3 ad. ♂, 3 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 30–April 21, 1931.

2 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930, and May 8–18, 1931.

The three most northern examples (Puerto Ayacucho) have much paler yellow rumps and upper tail coverts than do the other specimens. They are large (♂ wings 162.5–163; ♀ wings 159 mm.) but are matched in this respect by examples from Diamantina, near Santarem, Brazil. In fact, one of the Puerto Ayacucho males has the rump and upper tail coverts paler and purer yellow (less tinged with ochraceous or tawny) than any of a very large series from all parts of the range.

Thanks to the kind cooperation of the officials of the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia, and the Carnegie Museum, I have been able to amass a series of about 150 specimens of *jumana, citreopygius*, and the various races of *elegans*. The color of the rump and upper tail coverts is apparently a matter of individual variation—almost pure yellow, ochraceous, dusky tawny, orange-citrine, or even dark ochraceous-

olive. Likewise, birds may vary regardless of geography, season, sex, or age, in the darkness of the general upper and under parts, the range being from ochraceous-hazel to rufescent Van Dyke brown mixed to some extent with dark olive-green. The width of the dusky bars on the inner webs of the primaries is also variable in a purely individual fashion, a fact that adds emphasis to the stability achieved in this regard in the unbarred western race *citreopygius*. Some of the variations seen foreshadow to some extent the unbarred pattern of *citreopygius*. Thus, in several examples, the pale yellowish bars are marginally confluent and form a broad edging to the inner web, thereby reducing the length of their transverse indentations, which give rise to the barred pattern of the feathers. The color of the pale under wing areas is another purely individual variable, being correlated with the color of the rump and upper tail coverts. In examples where the latter areas are greenish we find this color tinging the under side of the wings; where the rump is yellowish or ochraceous, the underwing areas are paler and yellower.

These color variations are not peculiar to *Celeus jumana jumana* but occur also in *C. j. citreopygius* and in the forms of *C. elegans*. With regard to the latter group, it seems best to continue to consider it as a specifically distinct entity with its markedly pale crest easily setting it off from the *jumana* group.

As far as size is concerned the results of the present survey indicate that although there is a tendency for the more northern *jumana* to be larger than those from farther south this is not constant, and the extremes in the two areas are about the same. *Celeus jumana* and its close relative *elegans* give the impression of a very variable mass that has not settled down into component variants geographically.

Celeus jumana saturata Carriker appears to be a doubtful form. It can be matched by specimens from the Amazon which occur together with others that are typical *jumana*.

CELEUS GRAMMICUS GRAMMICUS (Malherbe): ***Rio Negro Barred Woodpecker***

Picus grammicus Malherbe, Mem. Soc. Roy. Liége, 1845, p. 69 ("Bresil"= Marabitanas, Rio, *fide* Naumburg, Bull. Amer. Mus. Nat. Hist., vol. 60, 1930, p. 183).

SPECIMENS COLLECTED

1 –, Brazil, Rio Negro, mouth of Rio Cauabury, October 21, 1930.

1 ad. ♂ (= ♀ ?), Brazil, Cachoeira Thomaz, Rio Cauabury, October 26, 1930.

1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

2 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 28–April 27, 1931.

Although the material available for comparison has been slight (one specimen each of the two other races *subcervinus* and *latifasciatus*) the variations presented by the present series are such as to raise some

doubt as to the validity of *C. g. undulatus* Todd of the Río Caura, Venezuela. This form, described from a single female, is said to differ from the nominate race in being smaller (wing 117, tail 68, bill 21 mm.), in having the barring of the upperparts and underparts much reduced, and in having the rump, flanks, inner webs of the remiges, and under wing coverts more yellowish (the rump between yellow-ochre and primuline yellow, the under wing coverts mustard yellow, and the inner webs of the remiges Naples yellow). One of the males from Cerro Yapacana has the barring of the upperparts and underparts noticeably reduced, especially above; while two of the females from the same locality show a divergence in the color of the under wing coverts and inner margins of the remiges that almost bespeaks dichromatism. In one of them these parts are exactly as in the description of the type of *undulatus*, while in the other they are much duskier and more olive—between yellow-ochre and old gold. In the former example the rump is more yellowish than in the latter, but not quite so light as in the description of *undulatus*. However, in the specimen with these critical areas most like *undulatus* the blackish barring is very strongly developed both above and below, and the birds are larger than *undulatus* (wing 125.1–125.2; tail 74–74.1; culmen from base 22.2–24 mm.), but in view of the variability in coloration and of the meagre material of *undulatus* it seems that the status of the latter is at least uncertain.

Some of the March and April examples were noted as being in breeding condition when collected. The October 26 specimen from the Rio Cauabury, Brazil, is in extremely worn plumage, quite the reverse of the one taken five days earlier on the Rio Negro. The latter bird has the rump much more yellowish or olive ocher than the former. The Orinoco birds have the feathers of the crown and crest uniformly rufous with no blackish medial streaks, while the Brazilian birds have blackish shaft streaks in these feathers. The unstreaked head condition in south Venezuelan birds has been noted by previous students, notably by Hellmayr (Nov. Zool., 1907, p. 80). It apparently means nothing very significant however, as Hellmayr found these streaks present in one and absent in another female from the Río Madeira (Calana and Alliana; Nov. Zool., 1910, p. 384). Berlepsch and Hartert (Nov. Zool., 1902, p. 94) write that birds from the Orinoco, north of our present area (Munduapo and Nericagua), have shorter bills than in others from upper Amazonia and that males from the Orinoco have shorter wings and tails as well. If we may look upon Rio Cauabury birds as similar to upper Amazonian ones, this distinction does not hold.

CROCOMORPHUS FLAVUS FLAVUS (P. L. S. Müller): ***Chestnut-winged Yellow Woodpecker***

Picus flavus P. L. S. **Müller**, Natursystem, Suppl., 1776, p. 91 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, Raudal Corocoro, below Playa de Candela, February 7, 1931.

1 im. ♀, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.

1 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 17–27, 1931.

2 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930, and May 16, 1931.

One of the April birds was noted as being in breeding condition when collected. A number of the birds taken in March and April show signs of molt.

These birds present a curious variation in color, for which no apparent explanation is available. Two of them, an adult male and an adult female, lack the bright light apricot yellow on the chin, throat, breast, and abdomen, having these parts between cream-buff and chamois. All the birds have the rectrices considerably matted with some yellowish powdery substance, probably derived from the trees on which they had been feeding.

Another example from Puerto Ayacucho was preserved in alcohol.

CEOPHLOEUS LINEATUS LINEATUS (Linnaeus): ***Lineated Woodpecker***

Picus lineatus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 174 (based on Daubenton, Planches enluminées . . . , pl. 717: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 8–18, 1931.

1 ad. ♀, Venezuela, Laguna Icacal, Bolívar, December 8, 1929.

PHLOEOCEASTES RUBRICOLLIS (Boddaert): ***Red-necked Woodpecker***

Picus rubricollis Boddaert, Table des planches enluminéez . . . , 1783, p. 37 (based on Daubenton, Planches enluminées . . ., pl. 509: Cayenne).

SPECIMENS COLLECTED

1 ad. –, Brazil, Camanãos, Rio Negro, December 23, 1930.

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 3, 1931.

1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 19, 1930.

2 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, December 4–5, 1930.

1 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 18–26, 1931.

One of the April birds was noted as being in breeding condition.

The depth of the cinnamon color of the under surface is somewhat deeper in freshly plumaged than in worn birds.

PHLOEOCEASTES MELANOLEUCOS MELANOLEUCOS (Gmelin): ***Black and White Woodpecker***

Picus melanoleucos Gmelin, Systema naturae, vol. 1, 1788, p. 426 (based on "Buff-crested Woodpecker" Latham: Surinam).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, above Cachoeira Manajó, October 31, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 9, 1931.

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 18, 1931.

1 ad. ♂, 2 ad. ♀, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 9–May 11, 1931, and January 10, 1930.

The series is fairly uniform except for the bird from the Rio Cauabury, which is distinctly lighter, more whitish below, and has the dark cross bars of the lower surface considerably restricted.

The identification of these skins as typical *melanoleucos* agrees with the findings of Pinto (Rev. Mus. Paulista, vol. 23, 1938, p. 515) for skins from São Gabriel and elsewhere in Amazonas, Brazil.

VENILIORNIS AFFINIS ORINOCENSIS Berlepsch and Hartert: ***Orinoco Woodpecker***

Veniliornis orinocensis Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 98 (Angostura and Munduapo, Orinoco region, Venezuela=Munduapo).

SPECIMENS COLLECTED

2 im. ♂, 1 im. – (♂), 1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 31, 1930–January 13, 1931.

1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 23, 1930.

1 im. ♀, 1 im. – (♀), Brazil, Serra Imeri, near Salto do Huá, December 7, 1930.

1 im. ♀, Venezuela, Chapazon, right bank Brazo Casiquiare, January 30, 1931.

1 im. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 1–3, 1931.

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 7, 1931.

1 im. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

The unsexed (but probably female) bird from Serra Imeri is more richly golden on the upperparts than any of the others and has sagittate whitish basal marks on the interscapulars and feathers of the upper back.

Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 203) consider *cassini* a race of *affinis*. In spite of the admittedly close similarity, this cannot be maintained, as both *cassini* and *orinocensis* occur together on the Caura and the Upper Orinoco. It follows, therefore, that *cassini* must be treated as a distinct species, differing from *orinocensis* (its geographic neighbor) in having prominent triangular spots of buff on most of the upper wing coverts and in having the ventral barring more black and white, less olivaceous. I am indebted to W. H. Phelps for this information.

PICUMNUS BUFFONI UNDULATUS Hargitt: ***Undulated Piculet***

Picumnus undulatus Hargitt, Ibis, 1889, p. 354 (Mount Roraima, British Guiana).

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, Tamatama, February 23, 1931.

1 im. ♀, Venezuela, Upper Orinoco, San Antonio, March 4, 1931.

2 im. ♂, 1 im. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

1 ad. ♂, 1 im. ♀, Venezuela, Upper Orinoco, Cerro Yapacana, April 29, 1931.

1 ad. ♂, 2 ad. ♀, Venezuela, Río Orinoco, Puerto Ayacucho, May 14, 1931, and January 3–4, 1930.

Although no specimens of this piculet were obtained on the Rio Negro and the Casiquiare, the form does occur there. Pinto (Rev. Mus. Paulista, vol. 22, 1937, p. 365) records it from the Rio Negro and the Rio Branco. No specimens of *P. buffoni exilis* have been seen in the present connection and the trinomial nomenclature here used is based on Pinto's treatment of these two forms.

Another specimen from Puerto Ayacucho was preserved in alcohol.

Recently Zimmer and Phelps (Am. Mus. Nov., No. 1312, 1946, p. 6) have recorded *clarus* for many localities in central and southeastern Venezuela—Mount Auyán-tepuí, La Unión, Suapure, Nericagua, and Upper Paragua River localities, among others.

Family DENDROCOLAPTIDAE: Woodhewers

DENDROCOLAPTES CERTHIA CERTHIA (Boddaert): ***Buffon's Woodhewer***

Picus certhia BODDAERT, Table des planches enluminéez . . . , 1783, p. 38 (Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 5, 1930.

1 ad. ♂, Brazil, Rio Cauabury, November 3, 1930.

1 ad. ♂, 1 ad. ♀, 1 im. –, Brazil, Salto do Huá, Rio Maturacá, November 20–22, 1930.

1 ad. ♀, Venezuela, Brazo Casiquiare, Caño Atamoni, February 6, 1931.

2 ad. ♂, Venezuela, Brazo Casiquiare, at mouth of Río Pacila, February 13, 1931.

7 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 1–28, 1931.

The Cerro Yapacana birds, collected in April, were noted as having enlarged gonads.

Though there is some variation in this excellent series, this appears to be wholly individual, and all are identified as *certhia*, although it may be noted that all average slightly grayer on the sides than do three skins from British Guiana. Hellmayr (Catalogue of the birds of the Americas, pt. 4, 1925, p. 262) reports a specimen from Marabitanas on the Rio Negro as *D. c. juruanus* Ihering. Skins in the present collection from the Brazilian localities listed above show some tendency to vary in the direction of *juruanus* but on the whole are nearer *certhia*.

XIPHOCOLAPTES PROMEROPIRHYNCHUS ORENOCENSIS Berlepsch and Hartert: ***Orinocoan Woodhewer***

Xiphocolaptes orenocensis BERLEPSCH and HARTERT, Nov. Zool., vol. 9, 1902, p. 65 (Nericagua, Río Orinoco).

SPECIMENS COLLECTED

1 ad. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 8–9, 1931.

The male was noted as being in breeding condition when collected. It is slightly darker above and below than the two females. Inas-

much as some of the races of this species are based on slight color differences, it would seem desirable to keep in mind a possible sexual dimorphism when making comparisons.

DENDROPLEX PICUS PICUS (Gmelin): ***Picine Woodhewer***

Oriolus picus Gmelin, Systema naturae, vol. 1, pt. 1, 1788, p. 384 (based on "Le Talapiot" Daubenton, Planches enluminées . . . , pl. 605: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Soledad, Anzoátegui, June 11, 1931, and December 7, 1929.

1 im. ♂, Venezuela, Laguna Icacal, near Ciudad Bolívar, December 8, 1929.

The two adult birds were in breeding condition.

These specimens are slightly less tawny, more dusky, below than are examples from French and British Guiana. Zimmer (Amer. Mus. Nov., No. 753, 1934, pp. 16–17) noted a similar condition in his series, but concluded that without still larger series of Orinocoan birds, he could not "do more than suggest the strong possibility of the intergradation of *picus* and *picirostris* somewhere between Ciudad Bolivar and Caicara."

An additional specimen, taken in Estado Bolívar, December 30, 1929, was preserved in alcohol.

DENDROPLEX PICUS DUIDAE Zimmer: ***Duida Picine Woodhewer***

Dendroplex picus duidae Zimmer, Amer. Mus. Nov., No. 753, 1934, p. 15 (Caño León, Mount Duida, Venezuela, altitude 325 feet).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 10–17, 1930.

2 ad. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 2–5, 1931.

1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

3 ad. ♂, 4 ad. ♀, Venezuela, Puerto Ayacucho, Upper Orinoco, January 2, 1930, and May 8–12, 1931.

This race has the chin and throat purer white, less washed with buffy and less strongly streaked with dusky, than does the nominate form. It ranges from the Upper Orinoco and Mount Duida to the Upper Rio Negro.

XIPHORHYNCHUS GUTTATUS GUTTATOIDES (Lafresnaye): ***Spotted Woodhewer***

Nasica guttatoides Lafresnaye, Rev. Mag. Zool., vol. 2, 1850, p. 387 (Loretto, Rio Marañon, Peru, and "Colombie"=Bogotá; Bogotá is the type locality, according to Zimmer, Amer. Mus. Nov., No. 756, 1934, p. 1).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 15, 1930.

1 ad. ♀, Brazil, Rio Maturacá, Amazonas, November 9, 1930.

1 ad. ♂, Brazil, Serra Imeri, Venezuelan border, December 2, 1930.

2 ad. ♂, 1 im. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 1–13, 1931.

2 ad. ♂, Brazil, Cucuhy, Rio Negro, February 7, 1930.

1 ad. ♂, Venezuela, Brazo Casiquiare, Caño Atamoni, February 6, 1931.

3 ad. ♂, 1 im. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11–13, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, Caño Mabinagui, February 20, 1931.

1 ad. ♂, Venezuela, Capibara, February 16, 1931.

1 ad. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

2 ad. ♂, 1 im. ♂, Venezuela, Upper Orinoco, right bank, opposite Corocoro Island, March 13–16, 1931.

Some of the January and February birds were noted as in breeding condition when collected.

This fine series bears out Zimmer's contentions as to the variability of this race (Amer. Mus. Nov., No. 756, 1934, pp. 1–4).

XIPHORHYNCHUS GUTTATUS POLYSTICTUS (Salvin and Godman): ***Spotted Woodhewer***

Dendrornis polysticta Salvin and Godman, Ibis, 1883, p. 210 (Bartica Grove, British Guiana).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 2–3, 1930, and May 14, 1931.

Zimmer (Amer. Mus. Nov., No. 754, 1934, p. 1) has pointed out that *polystictus* Salvin and Godman is an earlier name for *sororius* Berlepsch and Hartert.

This race differs from *X. g. guttatoides* in being less rusty below and in having more pronounced dark edgings to the pale streaks on the breast.

The May bird was in breeding condition.

XIPHORHYNCHUS PARDALOTUS (Vieillot): ***Levaillant's Woodhewer***

Dendrocopus pardalotus Vieillot, Nouv. Dict. Hist. Nat., nouv. éd., vol. 26, 1818, p. 117 (based on "Le Grimpar flambé" Levaillant, Histoire naturelle des promérops . . . , p. 74, pl. 30: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 2 ad. ♀, Brazil, Cucuhy, Rio Negro, February 2–8, 1930.

1 im. ♂, 1 ad. ♀, Brazil, Panela de Onca, Rio Cauabury, Amazonas, November 1, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Rio Maturacá, November 9, 1930.

2 ad. ♂, 2 ad. ♀, 1 im. –, Brazil, Salto do Huá, Rio Maturacá, November 12–20, 1930.

7 ad. ♂, 1 im. ♂, 2 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, November 27–December 6, 1930.

10 ad. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 29, 1931.

Some of the birds collected in November, December, March, and April were noted as being in breeding condition.

This woodhewer is found from the three Guianas west to southern Venezuela and south in Brazil to the north bank of the lower Amazon. The present series from the Rio Negro and the extreme southern part of Venezuela, immediately to the north, appear to constitute a slight extension southwestward of the known limits of the range of the

species. Though it seems to be a widely distributed form in the low country, it also ascends to as high as 1,100 meters in suitable places. Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 477) records it from altitudes of from 460–1,100 meters on Mount Auyan-tepui.

XIPHORHYNCHUS OBSOLETUS NOTATUS (Eyton): ***Upper Orinocoan Woodhewer***

Picolaptes notatus EYTON, Contr. Orn., 1852, p. 26 (no locality given).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Santa Isabel, Rio Negro, October 9, 1930.
1 ad. ♀, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.
1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 20, 1930.
1 im. ♂, Brazil, São Gabriel, Rio Negro, January 6, 1931.
2 ad. ♀, Brazil, Cucuhy, Rio Negro, February 5–8, 1930.
1 ad. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
1 ad. ♂, 1 ad. ♀, 1 ad. –, Venezuela, Brazo Casiquiare, Caño Atamoni, February 6, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 9, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12–13, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Caño Matipin, February 18, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Caño Durutomoni, February 19, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Buenos Aires, February 21, 1931.
1 ad. ♀, Venezuela, Upper Orinoco, Tamatama, February 23, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, Isla Temblador, February 25, 1931.
1 ad. ♂, 2 ad. ♀, 1 ad. –, Venezuela, Upper Orinoco, San Antonio, February 28–March 9, 1931.
3 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13–16, 1931.
5 ad. ♂, 2 ad. ♀, Venezuela, Upper Orinoco, Cerra Yapacana, March 18–April 27, 1931.
3 ad. ♂, 1 ad. ♀, Venezuela, Río Orinoco, Puerto Ayacucho, May 9–14, 1931, and January 2, 1930.

Birds in breeding condition were taken in November, February, April, and May.

This race ranges from the Rio Negro northward to the Casiquiare and the upper stretches of the Orinoco at least as far as Suapure. Zimmer (Amer. Mus. Nov., No. 756, 1934, p. 11) found that specimens from farther down the Orinoco (Caicara, Rio San Feliz, Sacupana) were closer to *obsoletus*.

CAMPYLORAMPHUS PROCURVOIDES SANUS Zimmer: ***Duida Sicklebill***

Campyloramphus procurvoides sanus ZIMMER, Amer. Mus. Nov., No. 728, 1934, p. 12 ("Campamento del Medio," Mount Duida, Venezuela, altitude 350 feet).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.

These specimens agree with the paratypical series in the American Museum of Natural History.

Both examples were noted as in breeding condition when collected.

NASICA LONGIROSTRIS (Vieillot): ***Long-billed Woodhewer***

Dendrocopus longirostris VIEILLOT, Nouv. Dict. Hist. Nat., nouv. éd., vol. 26, 1818, p. 117 (based on "Le Grimpar Nasican" Levaillant, Histoire naturelle des promérops . . ., p. 65, pl. 24: "Brésil").

SPECIMENS COLLECTED

1 im. ♀, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 16, 1931.

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 27, 1931.

2 im. ♀, Venezuela, Puerto Ayacucho, Orinoco, May 16, 1931, and January 6, 1930.

Material is not at hand to investigate the status of *N. l. australis* Griscom and Greenway, but even if it should prove valid (which, according to Zimmer is doubtful) the present birds would belong to the nominate form found to the north of the Amazon.

The immature birds are paler and more abundantly transversely flecked with dusky on the abdomen than are the adults.

GLYPHORHYNCHUS SPIRURUS RUFIGULARIS Zimmer: ***Rufous-throated Wedgebill***

Glyphorhynchus spirurus rufigularis ZIMMER, Amer. Mus. Nov., No. 757, 1934, p. 3 (Mount Duida (Campamento del Medio), Venezuela; altitude 350 feet).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 10, 1930.

1 ad. ♂, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 7, 1930.

2 ad. ♂, Brazil, mouth of Rio Maturacá, November 8, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Rio Maturacá, November 9–12, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, Venezuelan border, November 16–20, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 17, 1931.

2 ad. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.

1 im. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Caño Caripo, February 22, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.

2 ad. ♂, 3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 1–21, 1931.

A number of the birds collected from January 31 to April 19 were noted as being in breeding condition.

This fine series adds nothing either in addition to or by way of a modification or refutation of the comments given by Zimmer (*cit. supra*).

SITTASOMUS GRISEICAPILLUS AMAZONUS Lafresnaye: ***Amazonian Woodcreeper***

Sittasomus amazonus LAFRESNAYE, Rev. Mag. Zool., ser. 2, vol. 2, 1850, p. 590 (Upper Amazon, Perú).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 19, 1930.
1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, November 27, 1930.

The first of these two specimens has the under wing coverts and the axillars definitely tinged with ochraceous. In the second the under wing coverts are practically white. There seems thus some approach in these two which are from a rather outlying region, to the form that Zimmer has described from São Jose, near Faro, on the Rio Jamundá, under the name *S. g. axillaris* (Amer. Mus. Nov., No. 757, 1934, p. 9).

DECONYCHURA STICTOLAEMA SECUNDA Hellmayr: *Ecuadorian Deconychura*

Deconychura secunda Hellmayr, Bull. Brit. Orn. Club, vol. 14, 1904, p. 51 (Coca, Upper Río Napo, Ecuador)

SPECIMENS COLLECTED

2 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 4, 1930.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 28, 1931.

The two December birds were in breeding condition when collected; one of them and the April bird show signs of molting in the wings.

DENDROCINCLA FULIGINOSA PHAEOCHROA Berlepsch and Hartert: *Orinocoan Dendrocincla*

Dendrocincla phaeochroa Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 67 (Munduapo, Río Orinoco).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 27, 1930.
1 ad. ♂, Venezuela, Puerto Ayacucho, Orinoco, January 4, 1930.
2 ad. ♂, Venezuela, Upper Orinoco, right bank, opposite Corocoro Island, March 16, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 10–20, 1931.

Two of the birds (March and April) were noted as being in breeding condition.

The present series bears out Zimmer's contention (Amer. Mus. Nov., No. 728, 1934, p. 19) that birds from the Rio Negro are the same as those of southwestern Venezuela.

DENDROCINCLA MERULA BARTLETTI Chubb: *Chestnut-winged Dendrocincla*

Dendrocincla bartletti Chubb, Bull. Brit. Orn. Club, vol. 39, 1918, p. 5 (Chamicuros, Peru).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.
2 ad. ♂, 1 im. ♂, 3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 9–23, 1931.

One of the April birds is in molt in the wings. The March specimen and the one taken April 9 were found to be in breeding condition when collected. The immature bird is like the adults but has the entire bill

(both maxilla and mandible) dusky, whereas in the adult birds the mandible is pale.

In the absence of adequate material to enable us to come to an independent conclusion, we follow Zimmer (Amer. Mus. Nov., No. 728, 1934, pp. 14–15) in separating *bartletti* from typical *merula*.

Family FURNARIIDAE: Ovenbirds

SYNALLAXIS ALBESCENS TRINITATIS Zimmer: ***Venezuelan White-throated Spinetail***

Synallaxis albescens trinitatis ZIMMER, Amer. Mus. Nov., No. 819, 1935, p. 2 (Princestown, Trinidad Island).

SPECIMENS COLLECTED

2 im. ♂, 1 im. ♀, Venezuela, Soledad, Anzoátegui, December 1–7, 1929, and June 11, 1931.

One of the males and the female resemble the adult plumage; the other male, a much younger bird, has the entire top of the head buffy olive-brown with no chestnut cap. The chestnut patch on the bend of the wing is also paler and is much reduced in extent, comprising only the outer margins of the feathers; the tail is only two-thirds grown, and the bill is also considerably smaller than in a full-grown specimen.

This race is said to range south to the middle Orinoco. A specimen collected at Puerto Ayacucho, January 3, 1930, and preserved in alcohol, may belong to this race, but it is not certainly identifiable in its present condition.

CRANIOLEUCA VULPINA ALOPECIAS (Pelzeln): ***Northern Ruby-backed Spinetail***

Synallaxis alopecias PELZELN, Sitzungsb. math. nat. Kl. Akad. Wiss. Wien, vol. 34, 1859, pp. 101, 122 (Río Branco).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Puerto Ayacucho, Upper Orinoco, January 5, 1930.

This record helps to bridge the gap between the Amazonian and the previous Venezuelan ones (Orinoco Valley from the delta to beyond the falls of Maipures; upper Sarare).

Two specimens were collected—Estado Bolívar, December 30, 1929—and were preserved in alcohol.

SYNALLAXIS RUTILANS DISSORS Zimmer: ***Rio Negro Red Spinetail***

Synallaxis rutilans dissors ZIMMER, Amer. Mus. Nov., No. 819, 1935, p. 4 (Campos Salles, Manáos, Brazil).

SPECIMENS COLLECTED

1 im. ♀, Brazil, São Gabriel, Rio Negro, January 9, 1931.
2 im. ♂, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Matipin, February 18, 1931.
1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 5, 1931.

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6 ad. ♂, 1 im. ♂, 2 ad. ♀, 2 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 19–April 23, 1931.

One of the immature males from the Brazo Casiquiare presents an extreme plumage variation—in it the feathers of the upper half or more of the abdomen have conspicuous pale buffy to hazel shafts edged with hazel to auburn; the other immature birds resemble the adults.

Several of the April birds were noted as being in breeding condition when shot.

This race occurs along the eastern side of the Rio Negro from Manáos up to southwestern Venezuela, crossing the Casiquiare and the Upper Orinoco, and also along the Rio Branco to French and Dutch Guiana.

CRANIOLEUCA GUTTURATA (Lafresnaye and D'Orbigny): ***D'Orbigny's Spinetail***

Anabates gutturatus LAFRESNAYE and D'ORBIGNY, Synopsis avium, pt. 2, *in* Mag. Zool., vol. 8, 1838, cl. 2, p. 14 (Yuracares, Bolivia).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.

1 im. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.

1 ad. ♀, 1 im. ♀, Venezuela, Upper Orinoco, Cerro Cariche, February 24, 1931.

Carriker (Proc. Acad. Nat. Sci. Philadelphia, vol. 86, 1934, pp. 322–323) considered birds from Rioja and Moyobamba, Peru, and from Río Simo, eastern Ecuador, as *C. g. peruviana* (Cory) and later identified the present examples as of this race. Aside from the fact that he had no truly topotypical *gutturata* (he considered southeastern Peruvian examples from Puno as such) and therefore could not definitely prove the validity of Cory's race, it follows that if the present birds are also of this form, the name to be applied to them would have to be *hyposticta* (Pelzeln) based on Rio Negro material. This name, proposed in 1859 (Sitzungsb. math. nat. Kl. Akad. Wiss. Wien, vol. 34, pp. 102, 123) has 60 years' priority over *peruviana* Cory. However, two questions still remain unsettled—first, is *peruviana* distinct from *gutturata*, and second, if so, are Rio Negro and south Venezuelan birds (*hyposticta*) the same as *peruviana* or *gutturata* or are they different from both (*hyposticta*)?

Four specimens from eastern Ecuador are somewhat less brownish. more grayish olive above, than are our birds. Chapman (Bull. Amer. Mus. Nat. Hist., vol. 55, 1926, p. 435) found Ecuadorian birds (including two of the four here examined) to be more "olive above than four from Bolivia, but the latter are matched by one from the upper Orinoco (Mt. Duida) and another from the lower Orinoco (Caura). Pelzeln's *hyposticta* was based on a Rio Negro specimen, and until the status of the interior form can be determined, it seems unwise to

describe the Ecuadorean bird. The more northern birds are slightly smaller than those from Bolivia." From this it would seem that Rio Negro and Venezuelan birds (*hypositicta*) agree with Bolivian *gutturata* in color, and not with Ecuadorean (*peruviana*?) specimens. Carriker found topotypical *peruviana* to be darker than *gutturata* above, especially on the nape and upper back, the nape brownish slate (olive-brown in Puno "*gutturata*"), the underparts paler, more whitish, less ochraceous, in all of which characters the present series would be *gutturata*, yet he considered them as *peruviana*. This confusion suggests that *peruviana* may either be less well defined than Carriker believed or that it must be regarded as a purely Peruvian-Ecuadorian race. The latter seems unlikely as the birds from eastern Ecuador might then be expected to agree with the Bolivian-Brazilian-Venezuelan interior form and not with that of central northern Peru. Until further material becomes available it seems wisest to recognize no races of this spinetail. This, in effect, is a corroboration of Hellmayr's earlier judgment (Catalogue of the birds of the Americas, pt. 4, 1925, p. 131).

The two immature birds are slightly duskier below than the adults.

CRANIOLEUCA MÜLLERI (Hellmayr): ***Müller's Spinetail***

Siptornis mülleri Hellmayr, Rev. Franç. Orn., vol. 2, 1911, p. 1 (Fazenda Nazareth, Mexiana Island, Brazil).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Fazenda Marinha, São Joaquim, Rio Amazonas, Pará, September 18, 1930.

This is a bird of the Lower Amazon and does not occur in the Rio Negro–Orinoco drainage areas.

HYLOCTISTES SUBULATUS SUBULATUS (Spix): ***Amazonian Hyloctistes***

Sphenura subulata Spix, Avium species novae . . . Brasiliam . . ., vol. 1, 1824, p. 82, pl. 83 ("in sylvis fluminis Amazonum").

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Maturacá, November 9, 1930.

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 8, 1930.

1 ad. ♂, 1 im. ♀, Brazil, São Gabriel, Rio Negro, January 15, 1931.

Compared, and found to agree with, specimens from Río Suno, above Avila, Ecuador.

The immature bird is darker above than the adults.

PHILYDOR PYRRHODES (Cabanis): ***Cinnamon-rumped Philydor***

Anabates pyrrhodes Cabanis, *in* Schomburgk's Reisen in Britisch-Guiana . . ., pt. 3, "1848," p. 689 (coast of British Guiana).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 12, 1931.

The lone example of this widely ranging bird obtained by the expedition was in breeding condition when shot. There are no geographic variations of any account, according to Zimmer (Amer. Mus. Nov., No. 785, 1935, p. 6).

AUTOMOLUS OCHROLAEMUS TURDINUS (Pelzeln): *Pelzeln's Automolus*

Anabates turdinus PELZELN, Sitzungsb. math. nat. Kl. Akad. Wiss. Wien, vol. 34, 1859, p. 110, 131 (Borba, Rio Madeira; Barra do Rio Negro; Manáos designated by Hellmayr, Catalogue of the birds of the Americas, vol. 4, 1925, p. 220).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 16, 1930.

2 ad. ♂, 4 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–28, 1931.

This series is quite uniform in appearance; the birds are in fairly fresh plumage.

Another specimen, collected at São Gabriel, January 12, 1931, is preserved in alcohol.

AUTOMOLUS INFUSCATUS BADIUS Zimmer: *Zimmer's Automolus*

Automolus infuscatus badius ZIMMER, Amer. Mus. Nov., No. 785, 1935, p. 15 (Playa del Río Base, Mount Duida, Venezuela; altitude 550 feet).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.

2 ad. ♂, Brazil, Rio Maturacá, November 9–12, 1930.

4 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, November 28–December 4, 1930.

2 im. ♂, 1 ad. ♀, Brazil, Saõ Gabriel, Rio Negro, December 27, 1930–January 13, 1931.

1 ad. ♂, Colombian bank of Río Negro opposite San Carlos, January 29, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below Caño Durutomoni, February 19, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

1 ad. ♂, 1 ad. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 23, 1931.

Birds in breeding condition were taken in November, January, and April.

This fine series bears out the distinctions made for the race by Zimmer (*cit. supra*). This is another of the many birds that range from the Amazonian (Rio Negro) Basin into that of the Upper Orinoco without change.

The Venezuelan examples are somewhat more ashy, less buffy on the breast and abdomen, than are the Brazilian specimens. The former average slightly less rufescent above as well.

AUTOMOLUS RUFIPILEATUS CONSOBRINUS (Sclater): *Northern Chestnut-crowned Automolus*

Philydor consobrinus SCLATER, Proc. Zool. Soc. London, 1870, p. 328 ("Nova Granada int."="Bogota"; Villavicencio suggested by Chapman, 1917).

SPECIMENS COLLECTED

2 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 im. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

The two adults were noted as being in breeding condition.

The immature bird is slightly darker above and below than the adults and has narrow dusky edges and tips on the feathers of the throat and breast.

XENOPS MINUTUS RUFICAUDUS (Vieillot): *Guianan Xenops*

Xenopo ruficaudus VIEILLOT, Analyse d'une nouvelle ornithologie élémentaire, 1816, p. 68 (Cayenne).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Rio Maturacá, November 12, 1930.
1 ad. ♂, 2 im. ♂, 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 18–22, 1930.
1 ad. ♂, Brazil, Serra Imeri, December 2, 1930.
1 ad. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, at Caño Durutomoni, February 19, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.
1 im. ♂, 2 ad. ♀, 1 ad. —, Venezuela, Cerro Yapacana, Upper Orinoco, April 6–27, 1931.

The male collected at San Antonio, March 9, was noted as being in breeding condition.

The series from the Upper Orinoco agrees with birds from Cayenne and Surinam in being brighter and lighter in color and more definitely streaked. The Brazo Casiquiare specimens are similar to the Orinoco birds. In the Brazilian part of the series the birds from the western foothills of Serra Imeri and one from Rio Maturacá are like *ruficaudus*, while the four from Salto do Huá on the Maturacá are decidedly intermediate toward *remoratus*.

XENOPS MINUTUS REMORATUS Zimmer: *Zimmer's Xenops*

Xenops minutus remoratus ZIMMER, Amer. Mus. Nov., No. 819, 1935, p. 7 (Tatú, right bank of Rio Negro, Brazil).

SPECIMENS COLLECTED

1 im. –, Brazil, Santa Isabel, Rio Negro, October 10, 1930.
1 ad. ♀, Brazil, Rio Negro at mouth of Rio Cauabury, October 22, 1930.
1 ad. ♂, Brazil, Rio Cauabury below Cachoeira Destacamento, October 28, 1930.
1 im. –, Brazil, Rio Cauabury, above mouth of Rio Já, November 5, 1930.
1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.
1 ad. –, Venezuela, San Carlos, Río Negro, January 28, 1931.
1 ad. ♂, 1 im. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11–13, 1931.

These birds have the duller color above and below and the somewhat less accentuated streakings on the neck, foreneck, and upper breast that mark this rather indefinitely characterized subspecies.

XENOPS TENUIROSTRIS ACUTIROSTRIS Chapman: ***Sharp-billed Xenops***

Xenops acutirostris CHAPMAN, Amer. Mus. Nov., No. 86, 1923, p. 16 (Zamora, Prov. Loja, Ecuador).

SPECIMEN COLLECTED

1 ad. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 27, 1931.

Zimmer (Amer. Mus. Nov., No. 861, 1936, p. 17) was the first to record this race from extreme southern Venezuela (Río Huaynia, an affluent of the Casiquiare). The present example appears to be the northernmost one yet recorded.

MICROXENOPS MILLERI Chapman: ***Miller's Xenops***

Microxenops milleri CHAPMAN, Bull. Amer. Mus. Nat. Hist., vol. 33, 1914, p. 196 (foot of Mount Duida, Venezuela).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Rio Cauabury, Amazonas, October 31, 1930.

Although known from southern Venezuela (Mount Duida) and from northern Brazil, this bird does not seem to have been recorded before from the Rio Negro Basin.

SCLERURUS RUFIGULARIS FULVIGULARIS Todd: ***Ochreous-throated Leafscraper***

Sclerurus rufigularis fulvigularis TODD, Proc. Biol. Soc. Washington, vol. 33, 1920, p. 74 (Tamanoir, French Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 6, 1930.

2 ad. ♂, 1 im. ♂, 3 ad. ♀, 1 ad. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 28–April 26, 1931.

Two of the April birds were noted as being in breeding condition when collected.

Family FORMICARIIDAE: Ant-thrushes

CYMBILAIMUS LINEATUS INTERMEDIUS Hartert and Goodson: ***Amazonian Bush-shrike***

Cymbilaimus lineatus intermedius HARTERT and GOODSON, Nov. Zool., vol. 24, 1917, p. 495 (Humaythá, Rio Madeira, Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 30, 1930.
1 ad. ♂, Brazil, Rio Maturacá, November 9, 1930.
1 ad. ♂, 1 im.–Brazil, Salto do Huá, Rio Maturacá, November 19–20, 1930.
1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 30, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

2 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corcococoro, below Playa de Candela, February 9, 1931.
1 im. ♂, Venezuela, Brazo Casiquiare, Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.

There is considerable variation in the crown of the males; in some it is solid black, while in others it is thinly barred with white. Inasmuch as these bars are not terminal on the feathers, it is obviously not a matter of abrasion when they are absent. Zimmer (Amer. Mus. Nov., No. 584, 1932, p. 2) concluded from his study of this variation that "males just reaching maturity are more extensively white than old birds; at least, the lightest examples at hand from any locality usually show some traces of juvenal plumage not yet lost in molt . . ."

TARABA MAJOR SEMIFASCIATUS (Cabanis): ***Pará Great Ant-shrike***

Diallactes semifasciatus CABANIS, Journ. für Orn., vol. 20, 1872, p. 234 (Pará, Guiana, and Venezuela"—Pará accepted as type locality, auct. Hellmayr, Nov. Zool., vol. 12, 1905, p. 283).

SPECIMENS COLLECTED

1 ad. ♂, 5 ad. ♀, Brazil, São Gabriel, Rio Negro, December 26, 1930–January 9, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Raudal San Sebastián, February 1, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, below Playa de Candela, February 9, 1931.
3 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.
1 ad. ♀, Venezuela, Capibara, Piedra Pintada, February 16, 1931.
1 ad. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

Some of the December birds are in molt.

The Rio Negro females average very slightly darker than the Venezuelan specimens, but one of the latter (from Capibara) is just as dark as the São Gabriel birds.

SAKESPHORUS CANADENSIS INTERMEDIUS (Cherrie): ***Cherrie's Crested Ant-shrike***

Hypolophus canadensis intermedius CHERRIE, Bull. Mus. Brooklyn Inst. Sci., vol. 2, 1916, p. 277 (Caicara, Venezuela).

SPECIMENS COLLECTED

3 ad. ♀, Venezuela, Soledad, Anzoátegui, June 11–12, 1931, and December 7, 1929.
1 ad. ♂, Venezuela, near Soledad, December 1, 1929.
1 ad. ♂, Venezuela, Ciudad Bolívar, June 8, 1931.

The males have the under tail coverts white and an extensive line of white along each side of the somewhat restricted black of the breast, while the brown of the back is paler than in *trinitatis*. There is considerable white in the lores. The females are paler than *trinitatis* above and below.

Another specimen, taken in Estado Bolívar, December 30, 1929, was preserved in alcohol.

SAKESPHORUS CANADENSIS LORETOYACUENSIS (Bartlett): ***Bartlett's Crested Ant-shrike***

Thamnophilus loretoyacuensis BARTLETT, Proc. Zool. Soc. London, 1882, p. 374 (Loretoyacu, Río Marañon, northeast Peru).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Providencia, Rio Negro, October 7, 1930.
2 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 13, 1930.

This species is one of the few in which the birds of the Rio Negro are racially distinct from those of the Casiquiare and the Upper Orinoco.

The Santa Isabel bird, while not wholly typical, seems best placed with this race. Its back is dark brown with rather indistinct shaft streaks of black. The tibia are black and the sides and flanks very dark gray; the lower breast has a line of black but this does not extend on to the abdomen; the under tail coverts are white with dark gray bases. The bird appears to be somewhat intermediate toward *fumosus*.

SAKESPHORUS CANADENSIS FUMOSUS Zimmer: ***Zimmer's Crested Ant-shrike***

Sakesphorus canadensis fumosus ZIMMER, Amer. Mus. Nov., No. 668, 1933, p. 10 (Lalaja, Río Orinoco, Venezuela, altitude 325 feet).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 10, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, San Antonio, March 5, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

8 ad. ♂, 8 ad. ♀, 1 ad. "♂" (= ♀), Venezuela, Puerto Ayacucho, Río Orinoco, May 8–20, 1931.

The examples from the Casiquiare and from San Antonio are typical *fumosus;* the others from farther north are intermediate in their characters between *fumosus, intermedius,* and *pulchellus.* Zimmer (Amer. Mus. Nov., No. 668, 1933, p. 16) records a similar state of intermediacy for his material from the same area.

This is one of the rather few cases in which the subspecies inhabiting the Rio Negro (*loretoyacuensis*) is different from the one of the Casiquiare and the Upper Orinoco.

THAMNOPHILUS DOLIATUS FRATERCULUS Berlepsch and Hartert: ***Venezuelan White-barred Ant-shrike***

Thamnophilus doliatus fraterculus BERLEPSCH and HARTERT, Nov. Zool., vol. 9, 1902, p. 70 (Altagracia, Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 12, 1931.
1 ad. ♂, Venezuela, Soledad, Anzoátegui, December 10, 1929.
1 im. ♂, Venezuela, Ciudad Bolívar, November 27, 1929.

The immature male shows signs of molting.

The Cerro Yapacana bird is identified with this race with no real feeling of certainty. The locality is far to the south of the previous geographic limits of the race; it is far to the north of *T. d. signatus* Zimmer; in fact, the species does not seem to have been recorded from that area before, at least in print. A lone female specimen is obviously difficult to place, especially in a species where the best racial characters are those of the male plumage.

THAMNOPHILUS NIGROCINEREUS CINEREONIGER Pelzeln: ***Pelzeln's Cinereous Ant-shrike***

Thamnophilus cinereoniger PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 76, 143 (above Ayrão, near Villa de Moura, Marabitanas, etc. . . . ; type from Rio Amajau).

SPECIMENS COLLECTED

1 ad. ♀ (= ♂?), Brazil, Rio Negro, near Muirapinima, October 4, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, Rio Negro, Cucuhy, February 3–7, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, Rio Negro, Santa Isabel, October 13, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Rio Negro, São Gabriel, January 16–19, 1931.
1 ad. ♂, Venezuela, Río Negro, below San Carlos, January 27, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 30–31, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Cerro Guanari, February 4, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11–13, 1931.
1 im. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, February 28–March 9, 1931.
5 ad. ♂, 3 ad. ♀, Venezuela, Upper Orinoco, right bank, opposite Corocoro Island, March 13–16, 1931.

One of the specimens taken in March was noted as being in breeding condition; birds in molt were shot in October and January.

This race is restricted to the Upper Rio Negro and the Upper Orinoco, northward at least to Altagracia.

THAMNOPHILUS AETHIOPS POLIONOTUS Pelzeln: ***Natterer's Ant-shrike***

Thamnophilus polionotus PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 77, 147 (Marabitanas, Rio Negro, Brazil).

SPECIMENS COLLECTED

2 ad. ♂, Brazil, Cucuhy, Rio Negro, February 5–8, 1930.
1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 15, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Cachoeira Manajó, Rio Cauabury, October 30, 1930.
1 ad. ♂, Brazil, Rio Cauabury, above mouth of Rio Já, November 4, 1930.
1 ad. ♂, Brazil, Rio Maturacá, November 11, 1930.
2 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 17–24, 1930.

1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, December 6, 1930.
3 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 2–13, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 30, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.
4 ad. ♂, 5 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 25, 1931.

One of the São Gabriel males and the female from there have a concealed white patch on the interscapulars.

Some of the examples collected in January and in April show signs of molt.

This form ranges from the Río Negro to the Upper Orinoco and to the Caura in Venezuela.

THAMNOPHILUS MURINUS MURINUS Sclater and Salvin: ***Mouse-colored Ant-shrike***

Thamnophilus murinus Sclater and Salvin, Proc. Zool. Soc. London, 1867, pp. 750, 756 (Barra do Rio Negro = Manáos, accepted as type locality, Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 69).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♀, Brazil, Cucuhy, Rio Negro, February 7–8, 1930.
2 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 9–10, 1930.
1 ad. ♀, Brazil, Rio Negro, mouth of Rio Cauabury, October 21, 1930.
1 ad. ♂, 2 ad. ♀, Brazil, Rio Cauabury, October 28–November 7, 1930.
1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 17, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 5–7, 1930.
3 ad. ♂, 1 im. ♂, 3 ad. ♀, Brazil, São Gabriel, Rio Negro, December 29, 1930–January 16, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.
1 im. ♂, 2 ad. ♀, 1 ad.-(♂), Venezuela, Cerro Yapacana, Upper Orinoco, March 30–April 25, 1931.

One of the April birds was noted as being in breeding condition when collected.

This ant-shrike ranges along both banks of the Rio Negro and north to the Upper Orinoco and thence eastward to British Guiana and Surinam. Zimmer has noted (Amer. Mus. Nov., No. 647, 1933, p. 8) that the British Guiana males are a very little darker than typical *murinus*, thereby slightly approaching *cayennensis*. Only one male from British Guiana has been available for study in the present connection, and it fails to bear out this observation agreeing with those other specimens noted by Zimmer that are indistinguishable from Rio Negro examples.

THAMNOPHILUS AMAZONICUS CINEREICEPS Pelzeln: ***Gray-capped Ant-shrike***

Thamnophilus cinereiceps Pelzeln, Zur Ornithologie Brasiliens, pt. 2, 1868, p. 77, 145 (Marabitanas, Upper Rio Negro).

SPECIMENS COLLECTED

2 ad. — (1 ♂, 1 ♀), 1 ad. ♀. Brazil, Salto do Huá, Rio Maturacá, November 18–23, 1930.

1 ad. —, (♀), 1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, December 4, 1930.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 30, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 5, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Id., March 15, 1931.
14 ad. ♂, 1 im. ♂, 6 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 20–April 29, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 2, 1930, and May 14, 1931.

This series shows a great deal of variation, extreme individuals looking as if they might well belong to separate subspecies. However, these variations appear to be individual, not geographic. It may be recalled that Zimmer (Amer. Mus. Nov., No. 647, 1933, p. 19) found similar variability in his much longer series. His comments might have been based on the present material, so well do they apply.

PYGIPTILA STELLARIS OCCIPITALIS Zimmer: ***Venezuelan Spotted-winged Bushbird***

Pygiptila stellaris occipitalis ZIMMER, Amer. Mus. Nov., No. 558, 1932, p. 3 (right bank of Río Casiquiare, Venezuela, opposite El Merey).

SPECIMENS COLLECTED

2 ad. ♂, 3 ad. ♀, Brazil, São Gabriel, Rio Negro, December 31, 1930–January 15, 1931.
1 ad. ♂, Venezuela, Raudal Corocoro, below Playa de Candela, February 9, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Caño Durutomoni, February 19, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.
1 im. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

The male from the Brazo Casiquiare, at Caño Durutomoni, although labeled as adult is either immature or wrongly sexed, as it has the female type of plumage, but has small white spots at the tips of some of the lesser upper wing coverts and has the posterior crown as well as the occiput gray.

The characters on which this race is founded are not wholly constant but are only average ones. Thus, two of the females in the present series have the occiput as brown as a female from Peru (*P. s. maculipennis*) and have the back with considerable olive-brownish tinge. On the whole, however, *occipitalis* appears to be a readily recognizable form.

Two other specimens from São Gabriel, January 12, 1931, were saved in alcohol.

MEGASTICTUS MARGARITATUS (Sclater): ***Pearly Bushbird***

Myrmeciza margaritata SCLATER, Proc. Zool. Soc. London, vol. 22, 1855, p. 253, pl. 71 (Chamicuros, northern Peru).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Rio Negro, mouth of Rio Cauabury, October 21, 1930.
1 ad. ♂, 1 ad. ♀, 1–, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.
1 ad. ♀, Brazil, Rio Cauabury, November 2, 1930.

This bird is apparently locally rare or absent in many parts of its range, as the members of the expeditions met with it only during a period of less than two weeks, although it is known to occur from eastern Peru and eastern Eucador to western Amazonia and adjacent southwestern Venezuela. Zimmer (Amer. Mus. Nov., No. 558, 1932, p. 6) considers it possible that "there is an actual continuity of range over an extensive area but that the bird is locally rare or subject to ecological restrictions that are not yet understood."

DYSITHAMNUS ARDESIACUS OBIDENSIS Snethlage: ***Northern Slaty Ant-shrike***

Dysithamnus ardesiacus obidensis SNETHLAGE, Orn. Monatsb., vol. 22, 1914, p. 40 (Obidos, north bank of Lower Amazon, northern Brazil).

SPECIMENS COLLECTED

1 im. ♂, 1 im. ♀, Brazil, São Gabriel, Rio Negro, December 26, 1930–January 3, 1931.
3 ad. ♂, 1 im. ♂, 1 ad. – (♀), Brazil, Salto do Huá, Rio Maturacá, November 14–23, 1930.
1 ad. ♂, 1 im. ♂, 1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, November 28–December 4, 1930.
3 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 25, 1931.

The immature males from Salto do Huá and São Gabriel are in adult plumage but have the throat pale as each of the black feathers is tipped with gray; the young male from Serra Imeri is, however, in the juvenal plumage. It is similar to the female in coloration but is considerably tinged with rufescent tawny both above and below. Immature females are like the adults.

An alcoholic specimen from Estado Bolívar, December 30, 1929, may belong here, but is not certainly identifiable in its present condition.

THAMNOMANES CAESIUS GLAUCUS Cabanis: ***Guianan Slaty Bushbird***

Thamnomanes glaucus CABANIS, Arch. Naturg., vol. 13, 1847, p. 230 (Cayenne).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 1–8, 1930.
2 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 9–15, 1930.
1 ad. ♀, Brazil, Rio Cauabury, Cachoeira Thomaz, October 26, 1930.
1 ad. ♀, Brazil, Rio Cauabury, Destacamento, October 28, 1930.
2 ad. ♂, Brazil, Rio Cauabury, Cachoeira, Manajó, October 30–31, 1930.
1 ad. ♀, Brazil, Rio Cauabury, Panela de Onca, November 1, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Rio Cauabury, November 5–6, 1930.
5 ad. ♂, 2 im. ♂, 2 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 14–24, 1930.

1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, December 6, 1930.
6 ad. ♂, 1 im. ♂, 4 ad. ♀, Brazil, São Gabriel, Rio Negro, December 26, 1930–January 14, 1931.
1 ad. ♀, Colombian bank of Río Negro opposite San Carlos, January 29, 1931.
1 ad. ♂, Venezuela, San Carlos, Río Negro, January 28, 1931.
2 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12, 1931.
1 ad. –, Venezuela, Brazo Casiquiare, Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.
1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.
3 ad. ♂, 1 im. ♂, 3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 23–April 29, 1931.

One of the April birds was noted as being in breeding condition; some of the February examples show evidences of molt.

This fine series is remarkably uniform. The darkest examples are from Venezuela, but others from the same localities are not so dark; the extremes in variation are slight at best.

In addition to the specimens listed above, 5 others were preserved in alcohol; 2 were taken at São Gabriel, January 10–12, 1931; 3 were collected at Salto do Huá, November 20–21, 1930.

MYRMOTHERULA BRACHYURA BRACHYURA (Hermann): ***Pygmy Ant-wren***

Muscicapa brachyura Hermann, Tabula affinitatum animalium . . ., 1783, p. 299, note (based on "Le petit Gobe-mouche tacheté, de Cayenne" Buffon).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 3–9, 1931.
1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 20, 1930.
1 ad. ♂, Colombian bank of the Río Negro opposite San Carlos, January 29, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

MYRMOTHERULA AMBIGUA Zimmer: ***Zimmer's Ant-wren***

Myrmotherula ambigua Zimmer, Amer. Mus. Nov., No. 523, 1932, p. 5 (Playa del Río Base, Mount Duida, Venezuela, altitude 550 feet).

SPECIMENS COLLECTED

1 im. ♀, Brazil, São Gabriel, Rio Negro, December 31, 1930.
1 ad. – (= ♀), Venezuela, Brazo Casiquiare, Caño Caripo, February 22, 1931.

These two specimens agree with the description of *M. ambigua*. The São Gabriel one constitutes a slight extension of the known range.

MYRMOTHERULA SURINAMENSIS SURINAMENSIS (Gmelin): ***Surinam Ant-wren***

Sitta surinamensis Gmelin, Systema naturae, vol. 1, pt. 1, 1788, p. 442 (based on "Surinam Nuthatch" Latham, A general synopsis of birds, vol. 1, pt. 2, p. 654, pl. 28: Surinam).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 9, 1931.

Hellmayr (Catalogue of the birds of the Americas, vol. 3, 1924, p. 135, footnote) writes that a male of this form from Munduapo, Río Orinoco "(about two days by canoe, below S. Fernando de Atabapo) is more likely to pertain to *M. s. multostriata*, but the question cannot be satisfactorily settled until females come to hand . . ." The present female, from farther south still, is definitely of the nominate subspecies, having the sides of the head light cinnamon-rufous without any dusky streaks. It appears that *M. s. multostriata* does not cross to the north side of the Amazon but is a bird of the forest to the south of that river.

MYRMOTHERULA CHERRIEI Berlepsch and Hartert: ***Cherrie's Ant-wren***

Myrmotherula cherrieri Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 72 (Perico, Upper Orinoco, Venezuela).

SPECIMENS COLLECTED

1 ad. — (= ♂), Brazil, Rio Negro, near Muirapinima, October 4, 1930.

3 ad. ♂, 4 ad. ♀, Venezuela, Upper Orinoco, San Antonio, March 3–5, 1931.

3 ad. ♂, 2 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 12–13, 1931.

3 ad. ♂, 1 im. ♂, 2 ad. ♀, Venezuela, Upper Orinoco, Cerro Yapacana, April 10–29, 1931.

7 ad. ♂, 1 im. ♂, 5 ad. ♀, Venezuela, Río Orinoco, Puerto Ayacucho, January 2–3, 1930, and May 8–17, 1931.

The specimen from near Muirapinima appears to be the first record of this species outside of the drainage area of the Upper Orinoco and is therefore the first one from Brazil. Lest it be thought that it is *M. surinamensis* wrongly named, it may be stated that it has the longer bill and black mandible of *cherriei*. By extending the known range southward to the Upper Rio Negro this specimen also helps to settle the possibility of *cherriei* and *surinamensis* being conspecific; the overlap of the ranges of the two would seem to negative such a suggestion. None of the characters separating the males of the two species seem to hold except for the pale mandible and shorter bill of *cherriei*. The females are far more distinct.

One of the March specimens was in molt when collected.

A pair collected at Puerto Ayacucho, January 4, 1930, was preserved in alcohol. These two are in addition to the skins listed above.

MYRMOTHERULA GUTTATA (Vieillot): ***Rufous-bellied Ant-wren***

Myrmothera guttata Vieillot, La galerie des oiseaux . . . , vol. 2, *ca.* 1825, p. 251, pl. 155 (Cayenne).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Rio Cauabury, below mouth of Rio Já, November 3, 1930.

2 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 20–22, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, November 30–December 4, 1930.

1 im. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

There appear to be no published records from the Rio Negro, although the species has been taken at Manáos, and on the Upper Caura in Venezuela. The present specimens therefore fill a gap in the previously known range of this ant-wren.

MYRMOTHERULA HAEMATONOTA PYRRHONOTA Sclater and Salvin: ***Rio Negro Rufous-backed Ant-wren***

Myrmotherula pyrrhonota Sclater and Salvin, Nomenclator avium neotropicalium, 1873, p. 160 (Marabitanas, Rio Negro; designated as restricted type locality by Hellmayr, Catalogue of the birds of the Americas, pt. 3, 1924, p. 147).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, October 28, 1930.
1 ad. ♂, Brazil, Cachoeira, Rio Cauabury, October 30, 1930.
2 im. ♂, 2 ad. ♀, Brazil, Rio Maturacá, November 9–11, 1930.
3 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 21–25, 1930.
2 im. ♂, 2 ad. ♀, Brazil, Serra Imeri, Rio Maturacá, November 27–December 2, 1930.
3 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, December 30, 1930–January 6, 1931.
1 ad. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.
1 ad. ♂, 2 ad. ♀, Venezuela Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ad. – (♂), 1 im. – (♂), Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.
1 ad. ♂, 2 im. ♂, 3 ad. ♀, Venezuela, Upper Orinoco, Cerro Yapacana, March 30–April 29, 1931.

These birds agree with Zimmer's observation (Amer. Mus. Nov., No. 523, 1932, p. 15) that *pyrrhonota* is a recognizable race, but with distinguishing characters other than those on which it was originally described. The males are brighter and purer mahogany red on the back, paler gray on the breast, and more brownish on the flanks than in the nominate race; the females are more orange-ochraceous below.

Some of the April birds were noted as being in breeding condition when collected.

MYRMOTHERULA AXILLARIS MELAENA (Sclater): ***Black Ant-wren***

Formicivora melaena Sclater, Proc. Zool. Soc. London, vol. 25, 1857, p. 239 (Bogotá).

SPECIMENS COLLECTED

2 ad. ♂, 2 –, Brazil, Cucuhy, Rio Negro, February 3–7, 1930.
1 ad. ♀, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.
1 ad. ♂, 2 im. ♂, 1 im. ♀, Brazil, Rio Cauabury, October 28–November 6, 1930.
1 ad. ♂, 1 im. ♂, Brazil, Rio Maturacá, November 9–11, 1930.
1 ad. ♂, 1 ad. ♀, 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 20–24, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 27–31, 1930.

1 ad. ♂, Colombian bank of Río Negro, opposite San Carlos, January 29, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, Cerro Guanari, February 4, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 7–9, 1931.
2 ad. ♂, 2 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 10–12, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.
2 ad ♂, 2 im. ♂, 2 ad. ♀, 2 im. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13–16, 1931.
8 ad. ♂, 2 im. ♂, 4 ad. ♀ im. 2 ♀, Venezuela, Upper Orinoco, Cerro Yapacana, March 23–April 22, 1931.
4 ad. ♂, 1 ad. ♀, Venezuela, Río Orinoco, Puerto Ayacucho, January 2–4, 1930, and May 14, 1931.

Some of the birds taken in March and April were in breeding condition; molting specimens were collected in November.

This subspecies occurs from eastern Peru and eastern Ecuador, to eastern Colombia, southwestern Venezuela (the upper Orinoco and the Casiquiare), and to the Upper Rio Negro and its tributaries as far east as Santa Isabel. According to Zimmer's findings (Amer. Mus. Nov., No. 524, 1932, p. 6) the nominate race occurs on both banks of the Rio Negro east of the Rio Branco. We have here another instance of a river, such as the Branco, apparently demarcating the ranges of two geographically contiguous races, while the watershed between the Negro and the Orinoco systems appears to have no such effect.

A specimen preserved in alcohol was collected at Puerto Ayacucho, January 3, 1930, in addition to the skins listed above.

MYRMOTHERULA LONGIPENNIS LONGIPENNIS Pelzeln: ***Long-winged Ant-wren***

Myrmotherula longipennis Pelzeln, Zur Ornithologie Brasiliens . . ., pt. 2, 1868, p. 82, 153 (Rio Negro, Marabitanas).

SPECIMENS COLLECTED

1 im. ♂, 1 im. ♀, Brazil, Cucuhy, Rio Negro, February 2–5, 1930.
1 ad. ♀ (= ♂), Brazil, Rio Cauabury, below Cachoeira, October 28, 1930.
1 ad. ♂, Brazil, Rio Cauabury, Cachoeira Manajó, October 30, 1930.
1 ad. ♂, 1 im. ♂, 2 ad. ♀, Brazil, Rio Cauabury, November 4–6, 1930.
3 ad. ♂, 3 im. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 17–23, 1930.
5 ad. ♂, 2 ad. ♀, 1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, November 27–December 4, 1930.
1 ad. ♂, Colombian bank of Río Negro, opposite San Carlos, January 29, 1931.
1 ad. ♀, Venezuela, San Carlos, Río Negro, January 28, 1931.

Birds noted as being in breeding condition were collected in October and November; birds showing signs of molt were taken in November and January.

Gray-breasted tree ducks (*Dendrocygna discolor*) at Puerto Ayacucho, Venezuela.

Tame Orinoco geese (*Alopochen jubata*) at Carvoeiro, Rio Negro, Brazil.

Young collared plover (*Charadrius collaris*) near San Carlos, Upper Orinoco, Venezuela.

Nest depression and eggs of Schomburgk's nighthawk (*Hydropsalis climacocerca schomburgki*) at Cachoeira Destacamento, Brazil.

Immature females are more orange-ochraceous on the chin, throat, and breast than are adults of the same sex. Immature males are like the young females but somewhat duskier, washed with olive rather than with orange on their ochraceous throats and breasts.

MYRMOTHERULA MENETRIESII PALLIDA Berlepsch and Hartert: ***Western Gray-throated Ant-wren***

Myrmotherula cinereiventris pallida Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 74, pt. (Nericagua, Río Orinoco, Venezuela).

SPECIMENS COLLECTED

2 im. ♀, Brazil, Cucuhy, Rio Negro, February 1–8, 1930.
1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 17, 1930.
1 ad. ♀, Brazil, Rio Negro, mouth of Rio Cauabury, October 22, 1930.
1 ad. ♂, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 31, 1930–January 1, 1931.
1 ad. ♂, 2 im. ♂, 1 ad. – (= ♂), 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 14–23, 1930.
1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, Rio Maturacá, December 4, 1930.
1 ad. ♂, 1 ad. ♀, Venezuela, San Carlos, Río Negro, January 28, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 30, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Durutomoni, February 19, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24 1931.
3 ad. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 21–25, 1931.

Birds in breeding condition were taken in April; specimens in molt in February.

This is another of the many forest birds that range unchanged from the Rio Negro to the Upper Orinoco.

A specimen, preserved in alcohol, was taken at Salto do Huá, November 20, 1930. It is an addition to the skins listed above.

HERPSILOCHMUS DORSIMACULATUS Pelzeln: ***Spotted-backed Antbird***

Herpsilochmus dorsimaculatus Pelzeln, Zur Ornithologie Brasiliens . . ., pt. 2, 1868, p. 60, 150 (Marabitanas, Upper Rio Negro).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, November 29, 1930.
1 im. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 31, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.

The spotted-backed antbird is one of the very few full species known only from the upper Río Negro and the adjacent portions of southern Venezuela (Upper Orinoco and Upper Caura Rivers).

FORMICIVORA GRISEA GRISEA (Boddaert): ***Guiana Antbird***

Turdus grieseus BODDAERT, Table des planches enluminéez . . ., 1783, p. 39 (based in "Le Grisin, de Cayenne" Daubenton, Planches enluminées . . ., pl. 643, fig. 1: Cayenne).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Manáos, September 30, 1930.

It seems strange that but a single example of this antbird was obtained on the Rio Negro and so considerable a series of the next two forms in the Venezuelan territory farther north.

FORMICIVORA GRISEA RUFIVENTRIS Carriker: ***Carriker's Antbird***

Formicivora grisea rufiventris CARRIKER, Auk, 1936, p. 316 (Cerro Yapacana, Upper Orinoco River, Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 12, 1931.

6 ad. ♂, 1 im. ♂, 8 ad. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 12–April 27, 1931.

This is the original series on which Carriker's studies leading to his description of the form were based. As he says, the male is very similar to that of *F. g. grisea* of the Guianas but averages slightly darker brown above and with shorter wings (52–54 mm. as against 57–59 mm.), but the female is much more richly colored, the underparts being rich rufescent or cinnamon-ochraceous instead of pale ochraceous, the upperparts more rufescent, the supraloral and superciliary streaks cinnamon-ochraceous instead of white, the wing coverts almost entirely black, only the inner greater series being slightly shaded with chocolate-brown, with the white tips more pronounced throughout.

A number of the birds were noted by the collectors as being in breeding condition.

The immature male resembles the female in plumage but is slightly paler ochraceous below, and is acquiring the black adult feathers on the chin, throat, and breast, and, to a lesser extent, on the abdomen.

FORMICIVORA INTERMEDIA ORENOCENSIS Hellmayr: ***Orinoco Antbird***

Formicivora orenocensis HELLMAYR, Bull. Brit. Orn. Club, vol. 14, 1904, p. 54 (Altagracia, Río Orinoco, Venezuela).

SPECIMENS COLLECTED

3 ad. ♂, 1 im. ♂, 2 ad. ♀, 1 –, Venezuela, Puerto Ayacucho, Upper Orinoco, January 3, 1930, and May 9–18, 1931.

2 ad. ♂, 1 ad. ♀, Venezuela, Ciudad Bolívar, June 8–11, 1931.

1 im. ♀, Venezuela, Soledad, Anzoátegui, November 29, 1929.

1 ad. ♂, Venezuela, Laguna Icacal, Estado Bolívar, December 8, 1929.

Some of the May birds were noted as being in breeding condition when collected.

Carriker's arrangement of the *Formicivora grisea* and *F. intermedia* complex seems better than the older one he altered and is followed in this report, although it must be admitted that *hondae* does partly bridge the gap. However, inasmuch as *orenocensis* and *rufiventris* both occur at Puerto Ayacucho, it certainly seems better to regard them as specifically distinct.

This series has already been published on by Carriker (Auk, 1936, pp. 316–317).

An additional specimen from Puerto Ayacucho, taken January 3, 1930, was preserved in alcohol.

TERENURA SPODIOPTILA SPODIOPTILA Sclater and Salvin: ***Ash-winged Ant-wren***

Terenura spodioptila Sclater and Salvin, Ibis, 1881, p. 270, pl. 9, fig. 1 (Bartica Grove, British Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, November 5, 1930.
1 im. ♂, Brazil, Cucuhy, Rio Negro, February 8, 1930.
1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.

It is unfortunate that no adult male was collected on either the Rio Cauabury or the Rio Negro, as it would have made more definite a comparison with the description of *T. s. signata* Zimmer, described from Mount Curycuryari, on the right bank of the Rio Negro. There is no chestnut on the lesser upper wing coverts of the immature male from Cucuhy (*signata* is said to have these feathers chestnut instead of gray as in *spodioptila*), and it seems better to call the specimen typical *spodioptila*. Furthermore, in support of this decision, it may be noted that the lower wing band (on the greater coverts) is as broad as in the two adult males from the Casiquiare and the upper Orinoco (whence Zimmer records *T. s. spodioptila*), while in the description of *signata* this wing band is described as narrower than in the nominate form. The female from the Rio Cauabury is assumed to be of the same subspecies as the Cucuhy male; no females have been available for comparison.

The present race appears to be an addition to the known avifauna of Brazil. It is not listed by Pinto (Catalogo Aves do Brasil, pt. 1, 1938, p. 490).

RAMPHOCAENUS MELANURUS DUIDAE Zimmer: ***Duida Straight-billed Ant-wren***

Ramphocaenus melanurus duidae Zimmer, Amer. Mus. Nov., No. 917, 1937, p. 15 (Esmeralda, Mount Duida, Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, below Playa de Candela, February 9, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Durutomoni, February 19, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

The material available for comparison indicates that the dorsal coloration of this race is not particularly different from that of *R. m. trinitatis*, but that the present race may be identified by its more deeply ochraceous sides and flanks.

MICROBATES COLLARIS COLLARIS (Pelzeln): ***Collared Ant-wren***

Rhamphocaenus collaris PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 84, 157 (Barra do Rio Negro=Manáos).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Brazil, Salto do Huá, Rio Maturacá, Venezuelan border, November 17–23, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 4–5, 1930.

The immature male is brighter, more rufescent above than the adults.

CERCOMACRA CINERASCENS CINERASCENS (Sclater): ***Gray Antbird***

Formicivora cinerascens SCLATER, Proc. Zool. Soc. London, vol. 25, 1857, p. 131 (Río Napo, eastern Ecuador).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Barcellos, Rio Negro, October 6, 1930.

1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 16, 1930.

1 ad. ♀, Brazil, Rio Negro at mouth of Rio Cauabury, October 22, 1930.

The females have the lower back much more grayish, less brownish than the mantle. Zimmer (Amer. Mus. Nov., No. 558, 1932, p. 21) noted the same in his birds from the Upper Rio Negro and the Upper Orinoco, but writes that most of them are not distinguishable from Ecuadorian examples.

CERCOMACRA TYRANNINA TYRANNINA (Sclater): ***Tyrannine Antbird***

Pyriglena tyrannina SCLATER, Proc. Zool. Soc. London, vol. 23, 1855, p. 90, pl. 98 ("Bogotá," eastern Colombia).

SPECIMENS COLLECTED

2 ad. ♀, Brazil, São Gabriel, Rio Negro, January 14–16, 1931.

There is a possibility that more extensive material from the area may indicate that the Upper Rio Negro is inhabited by an unnamed race of this antbird. Hellmayr (Catalogue of the birds of the Americas, vol. 3, 1924, p. 218, footnote) writes that "three birds from Marabitanas, Rio Negro, . . . appear to belong to *tyrannina*, although the female has the underparts nearly as deep ochraceous tawny as *crepera* . . ." That is true of the present examples as well.

CERCOMACRA NIGRICANS Sclater: ***Black Tyrannine Antbird***

Cercomacra nigricans SCLATER, Proc. Zool. Soc. London, vol. 26, 1858, p. 245, (Santa Marta).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Soledad, Anzoátegui, December 10, 1929.

The specimen is molting the wing feathers.

Material has not been available to investigate the status of *C. n. atratus* Todd or *C. n. maculosa* (Sclater), but inasmuch as most recent authors appear to agree in referring to *nigricans* binomially the same method has been followed here.

MYRMOBORUS LEUCOPHRYS ANGUSTIROSTRIS (Cabanis): ***Schomburgk's Antcreeper***

Conopophaga angustirostris CABANIS, *in* Schomburgk's Reisen in Britisch-Guiana, pt. 3, 1848, p. 685 (coastal forests of British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

3 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, below Playa de Candela, February 9, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.

1 ad. ♂, Venezuela, Capibara, Piedra Pintada, February 16, 1931.

1 ad. ♂, 1ad. ♀, Venezuela, Brazo Casiquiare, near Caño Matipin, February 18, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

Apparently this form is the one found along the Rio Negro; also it has a wide range in the lowlands of the great Amazonian forest from Cayenne through southern Venezuela to the Casiquiare to Colombia, eastern Ecuador, eastern Peru, and northern Bolivia.

MYRMOBORUS MYOTHERINUS ELEGANS (Sclater): ***Sclater's Black-faced Antcreeper***

Hypocnemis elegans SCLATER, Proc. Zool. Soc. London, vol. 25, 1857, p. 47 (based on *Hypocnemis*—? Sclater, Proc. Zool. Soc. London, vol. 23, 1855, p. 147, "Bogota").

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Maturacá, November 8, 1930.

3 ad. ♂, 3 ad. ♀, Brazil, São Gabriel, Rio Negro, December 27, 1930–January 9, 1931.

Although this bird is known from southern Venezuela (Mount Duida and the Upper Orinoco) the present expedition failed to find it there, but only in the adjacent Rio Negro country of Brazil. It occurs south as far as São Gabriel, on the left bank of the Upper Rio Negro, but at Tabocal, on the right bank, not very far to the southeast, another subspecies, *M. m. ardesiacus* Todd, takes its place.

HYPOCNEMIS CANTATOR FLAVESCENS (Sclater): ***Sulphur-breasted Antbird***

Formicivora flavescens SCLATER, Proc. Zool. Soc. London for 1864, 1865, p. 609 (Marabitanas, Rio Negro, northwestern Brazil).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, 1 ad. –, Brazil, Cucuhy, Rio Negro, February 3–7, 1930.

1 ad. ♀, 1 ad. –, Brazil, Santa Isabel, Rio Negro, October 9–10, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.
1 ad. ♀, 1 im. –, Brazil, Rio Cauabury, November 4–5, 1930.
2 ad. ♂, 1 ad. ♀, 1 ad. –, Brazil, São Gabriel, Rio Negro, November 9, December 31, 1930, and January 2–6, 1931.
1 ad. ♂, 1 im. ♂, 1 im. –, Brazil, Salto do Huá, Rio Maturacá, November 19–22, 1930.
1 ad. ♂, 1 ad. ♀, 1 ad. –, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 3–4, 1930.
1 ad. ♀, 1 ad. –, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
1 im. –, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 1, 1931.
1 ad. ♂, Venezuela, Solano, Brazo Casiquiare, February 2, 1931.
1 ad. ♂, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.
1 ad. ♂, 1 ad. –, Venezuela, Brazo Casiquiare below mouth of Río Pacila, February 12, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 4–8, 1931.
10 ad. ♂, 7 ad. ♀, 3 ad. –, 3 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 18–April 27, 1931.

A common bird along the Rio Negro, the Casiquiare, and the Upper Orinoco. Females are more brownish, less grayish, on the upper back than are the males, and on the basis of this character it would be possible, if desired, to guess the sex of those specimens left without such determinations in the field. The variation in the dark markings is very considerable, the tendency to streaking and to barring being quite unequal in different specimens.

In addition to the skins listed above, four birds were preserved in alcohol—two from Santa Isabel, October 9–November 21, 1930; one from São Gabriel, January 10, 1931; and one from Cachoeira Caranguejo, Rio Cauabury, October 24, 1930.

HYPOCNEMOIDES MELANOPOGON OCCIDENTALIS Zimmer: *Zimmer's Antcreeper*

Hypocnemoides melanopogon occidentalis Zimmer, Amer. Mus. Nov., No. 538, 1932, p. 21 (Puerto Indiana, Río Amazonas, Peru).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, 1 ad. ♀, Brazil, Cucuhy, Río Negro, February 3–4, 1930.
1 ad. ♀, Brazil, Rio Negro, October 4, 1930.
1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 13, 1930.
2 ad. ♀, Brazil, Rio Cauabury, November 4–5, 1930.
1 ad. ♂, Brazil, mouth of Rio Maturacá, November 8, 1930.
1 ad. ♀, 1 –, Brazil, Rio Maturacá, November 11, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, Venezuelan border, November 20–24, 1930.
1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 19, 1931.
1 ad. ♀, Venezuela, Río Negro Islands, January 27, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 31, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8–10, 1931.
2 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11–13, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Pamoni, February 19, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
2 ad. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.
3 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, San Antonio, February 28–March 2–9, 1931.
1 ad. ♂, 3 ad. ♀, Venezuela, Upper Orinoco, opposite Corocoro Island, right bank March 12–16, 1931.
2 ad. ♂, 2 ad. ♀, Venezuela, Upper Orinoco, Puerto Ayacucho, May 8–17, 1931.

One of the May specimens was noted as being in breeding condition when collected; some of the November, January, and February birds were in molt. One of the males from Playa de Candela is probably wrongly sexed, as it has the female plumage.

There is considerable variation in the darkness or paleness of the upperparts and breast and flanks, especially in the females from southern Venezuela. It should be kept in mind that Zimmer noted that south Venezuelan birds approach typical *melanopogon* in coloration and are in reality intermediate between the present race and the nominate form.

None of the present series has any concealed white patch on the interscapulars as Zimmer found in some Venezuelan birds, but quite a number have the basal portions of these feathers considerably paler gray than the exposed, more distal parts.

According to the specimens of the two races of this antcreeper listed by Zimmer (*cit. supra*, p. 24) the São Gabriel and, probably, the Cucuhy, birds should be *H. m. melanopogon*. I cannot distinguish them, however, from any of the Casiquiare or Orinoco birds. In fact, the female from São Gabriel is more in accord with the characters of *occidentalis* than are birds from the Upper Orinoco. Zimmer writes that typical *melanopogon* "approaches the range of *occidentalis* most closely on the Rio Negro in Brazil. Spreading northward from the Guianas, *melanopogon* extends westward along the left bank of the upper Rio Negro to São Gabriel, across the Negro from part of the area occupied by *occidentalis*. A series of both sexes from the right bank of the Negro near its mouth (Mirapinima and Igarapé Cacao Pereira) definitely belongs to *melanopogon* and shows that this form crosses the river somewhere between its mouth and the junction of the Branco . . . ." The influence of rivers as demarcating limits of subspecific ranges appears to be less marked in this than in many other species, as the nominate form crosses the Amazon itself between the Tocantins and the Xingú, and again between the Tapajóz and the Purús.

On December 30, 1929, two specimens were taken in Estado Bolívar, northern Venezuela, and were preserved in alcohol. It is not possible to identify them subspecifically in their present condition.

PERCNOSTOLA RUFIFRONS MINOR Pelzeln: *Smaller Black-headed Fire-eye*

Percnostola minor PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 86, 159 (São Isabel, Upper Rio Negro).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cucuhy, Rio Negro, February 1, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.

2 ad. ♂, 3 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 6–8, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 29, 1930.

1 ad. ♀, Venezuela, Brazo Casiquiare, near Caño Durutomoni, February 19, 1931.

The Cucuhy male is considerably darker, less slaty, more blackish, above than are the other males. It is in slightly more abraded plumage, but there is not enough difference in this respect to explain the darker coloration.

As Zimmer has pointed out (Amer. Mus. Nov., No. 584, 1932, p. 8) this race ranges from the Upper Rio Negro northward to the southern slopes of Mount Duida and the Upper Orinoco, and westward across the Río Uaupés into extreme eastern Colombia.

SCHISTOCICHLA LEUCOSTIGMA LEUCOSTIGMA (Pelzeln): *Spotted-winged Antcatcher*

Percnostola leucostigma PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, p. 86, 160 (Barra do Rio Negro = Manáos).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Salto do Huá, Venezuelan border, Rio Maturacá, November 18, 1930.

1 ad. ♂, Brazil, Serra Imeri, Venezuelan border, December 1, 1930.

These specimens appear to be the northwesternmost records for this antcatcher and help to close the rather large gap between the known ranges of this race and of *S. l. saturata* of Mount Roraima and of *S. l. obscura* of Mount Auyán-tepuí. They are definitely *leucostigma;* in fact, they show no tendency to vary in the direction of *S. l. saturata* or of *S. l. obscura.*

The immature bird is like the adult in plumage but has a few dark brownish feathers left on the scapulars, upper back, wings, sides, and flanks.

SCLATERIA NAEVIA ARGENTATA (Des Murs): *White-breasted Antcatcher*

Herpsilochmus argentatus DES MURS *in* Castelnau, Expédition dans les parties centrales de l'Amérique du Sud, pt. 7: Zoologie, sect. 1: Oiseaux, livr. 18, 1856, p. 56, pl. 17, fig. 2 (Nauta, northeastern Peru).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Serra Imeri, Rio Maturacá, November 27, 1930.

1 im. ♂, Brazil, São Gabriel, Rio Negro, January 9, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 14, 1931.

1 ad. ♂, 1 im. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 23–April 19, 1931.

With no comparative material other than a pair of adults of the nominate form the distinctness of *argentata* and *naevia* seems more than subspecific but lack of the other races, especially of *toddi*, and the comments in literature prevent any decision (*S. n. toddi* is said to form a connecting link between *naevia* and *argentata*. However, Todd (Proc. Biol. Soc. Washington, vol. 40, 1927, p. 165) considers *argentata* a full species, writing that "the yellow feet and nearly white (unstriped) under parts of this form are in my opinion good specific characters as compared with *S. naevia*, in spite of the somewhat intermediate character of the Tapajóz race."

MYRMECIZA LONGIPES GRISEIPECTUS Berlepsch and Hartert: ***Gray-chested Antcatcher***

Myrmeciza swiansoni griseipectus Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 76 (Caicara, Venezuela).

SPECIMENS COLLECTED

3 ad. ♂ 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 15–20, 1931.

The female was noted as being in breeding condition when collected.

MYRMECIZA ATROTHORAX ATROTHORAX (Boddaert): ***Black-throated Antcatcher***

Formicarius atrothorax Boddaert, Table des planches enluminéez . . ., 1783, p. 44 (based on "L'Alapi, de Cayenne" Daubenton, Planches enluminées . . . , pl. 701, fig. 2: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.
1 im. ♂, 1 im. ♀, Brazil, Serra Imeri, Salto do Huá, December 8, 1930.
8 ad. ♂, 3 ad. ♀, Brazil, São Gabriel, Rio Negro, December 31, 1930–January 19, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Raudal Corocoro, February 9, 1931.
1 im. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 10, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.
1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.
4 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 17–April 26, 1931.

One of the January males was noted as being in breeding condition when collected.

These birds vary considerably in size; thus the wing length varies from 54.8–60.1 mm. in males, from 55–59.1 mm. in females; the tail from 51–57.2 mm. in males, from 51–56.2 mm. in females; the culmen from the base from 17.3–19 mm. in males, 16.5–19.2 mm. in females.

MYRMECIZA DISJUNCTA Friedmann: ***Yapacana Antcatcher***

Myrmeciza disjuncta Friedmann, Proc. Biol. Soc. Washington, vol. 58, 1945, p. 83 (Cerro Yapacana, Upper Orinoco, Venezuela).

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 10–19, 1931.

The male is the type of the species. As stated in the original description, the type is in molt, and the incoming adult feathers of the wings and back and underparts are similar to those of the immature plumage, indicating that the adult male will probably be found to resemble the type. The species is not too distantly related to *Myrmeciza atrothorax* but is clearly specifically distinct from that form. After examining the present two specimens Dr. Zimmer noted that the general plumage has about the texture of *Cercomacra carbonaria* and suggested that it is possible that a fully adult male, if markedly different from the type, might show a closer relationship to that genus than the present examples demonstrate. The pattern of the markings of the upper wing coverts is very like that of some forms of *Cercomacra* (*serva*, for example), but the bill is that of *Myrmeciza*. Dr. Zimmer was unable to feel certain that the type had been correctly sexed, but this cannot be checked. It is unfortunately true that a number of specimens in the present collection appear to have been wrongly sexed by the collectors.

MYRMECIZA PELZELNI Sclater: ***Gray-bellied Antcatcher***

Myrmeciza pelzelni SCLATER, Catalogue of birds in the collection of the British Museum, vol. 15, 1890, p. 283 (Marabitanas, Rio Negro).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Cucuhy, Rio Negro, February 2, 1930.
1 ad. ♂, 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 24, 1930.
3 ad. ♂, 2 im. ♂, 3 ad. ♀, 1 ad. – (♂?), Brazil, Serra Imeri, November 26–December 2, 1930.

This is one of the very few birds that appears to be wholly restricted to the upper Rio Negro, not having been found yet on the adjacent portion of the Amazon or in the basin of the Casiquiare or the Upper Orinoco.

The immature males resemble the adults but have a few whitish or grayish feathers mixed in with the black of the breast; the immature female differs from adults of its sex in having the white of the throat less extensive, more encroached upon by feathers with squamate blackish markings, and in having the blackish margins of the pectoral feathers deeper, broader, and extending over more feathers posteriorly.

FORMICARIUS COLMA COLMA Boddaert: ***Guianan Ant-thrush***

Formicarius colma BODDAERT, Table des planches enluminéez . . . , 1783, p. 44 (based on "Le Colma, de Cayenne" Daubenton, Planches enluminées . . . , pl. 703, fig. 1: Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.
1 ad. ♀, Brazil, Rio Maturacá, November 9, 1930.
1 im. ♂, Brazil, Salto do Huá, Rio Maturacá, November 22, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 9, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, Chapazon, January 31, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, Caño Atamoni, February 6, 1931.
1 im. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, San Antonio, March 8, 1931.
2 ad. ♂, 3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 5–27, 1931.

This fine series and a smaller amount of comparative material bear out Zimmer's contention as to the conspecificity of *colma* and *ruficeps* (Amer. Mus. Nov., No. 584, 1932, pp. 10–12) and add nothing new to his discussion of *colma* and *nigrifrons*. The birds of the Upper Rio Negro, the Casiquiare, and the Upper Orinoco are an intermediate population showing tendencies to vary in the direction of *colma* and of *nigrifrons*, but are nearer to the former on the whole.

The April birds were noted as being in breeding condition when collected.

Two other specimens were preserved in alcohol; one was taken on the Rio Negro, February 9, 1931, and one at San Antonio, March 4, 1931.

PITHYS ALBIFRONS ALBIFRONS (Linnaeus): ***White-faced Antcatcher***

Pipra albifrons LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 339 (based on "The White-faced Manakin" Edwards, Gleanings of natural history, vol. 3, p. 280, pl. 344, fig. 1: "Guiana" = Cayenne).

SPECIMENS COLLECTED

8 ad. ♂, 1 im. ♂, 5 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 28–April 29, 1931.

The immature bird has the chin, throat, and forehead sooty like the back and lacks the crest. Most of the adults were noted as being in breeding condition when collected.

Hellmayr (Catalogue of the birds of the Americas, pt. 3, 1924, p. 297, footnote) writes that some specimens from the Upper Orinoco show evidences of transition from *albifrons* to *peruviana*. "Some are indistinguishable from typical *albifrons;* but three lack the white postocular streak and have more sooty gray on the lower throat . . . " One of the present series (a female) has the postocular streak suffused with chestnut but the others are typical *albifrons* in every way.

GYMNOPITHYS RUFIGULA RUFIGULA (Boddaert): ***Rufous-throated Antcatcher***

Turdus rufigula BODDAERT, Table des planches enluminéez . . ., 1783, p. 39 (based on "Petit Merle brun à gorge rousse, de Cayenne" Daubenton, Planches enlumineés . . ., pl. 644, fig. 2: Cayenne).

SPECIMENS COLLECTED

1 im. ♀, Brazil, Rio Cauabury, Amazonas, November 3, 1930.
1 ad. ♀, Brazil, Rio Já, Amazonas, November 3, 1930.
1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, November 29, 1930.

These examples extend the known range of this form slightly in the Rio Negro area.

GYMNOPITHYS RUFIGULA PALLIDA (Cherrie): ***Venezuelan Rufous-throated Antcatcher***

Anoplops rufigula palidus CHERRIE, Bull. Mus. Brooklyn Inst. Sci., vol. 1, No. 16, 1900, p. 390 (Suapure, Caura River).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Rio Já, Amazonas, November 3, 1930.

1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, November 29, 1930.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 7–8, 1931.

This is a poorly differentiated race, the supposedly paler coloration being very slight and not even constant. The birds are slightly smaller than others from the Rio Negro and from the Guianas.

GYMNOPITHYS LEUCASPIS LATERALIS Todd: ***Rio Negro Cinnamon Antcatcher***

Gymnopithys leucaspis lateralis TODD, Proc. Biol. Soc. Washington, vol. 40, 1927, p. 174 (Manacapurú, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♀, Brazil, São Gabriel, Rio Negro, January 14, 1931.

The immature bird resembles the adult but has a few dark brown feathers among the white ones on the breast and has a darker mandible.

In the absence of comparative material, these examples are identified subspecifically in accordance with Zimmer's revision of the species (Amer. Mus. Nov., No. 917, 1937, pp. 3–6).

HYLOPHYLAX NAEVIA CONSOBRINA Todd: ***Todd's Spotted-backed Antbird***

Hylophylax consobrina TODD, Proc. Biol. Soc. Washington, vol. 26, 1913, p. 172 (Río Mocho, upper Caura River, Venezuela).

SPECIMENS COLLECTED

1 ad. – (= ♂), Brazil, Rio Cauabury, below Cachoeira Destacamento, October 28, 1930.

1 ad. – (= ♂), Brazil, Rio Cauabury, above Cachoeira Manajó, October 31, 1930.

2 ad. ♂, 1 ad. ♀, 1 ad. – (= ♀), Brazil, Salto do Huá, Rio Maturacá, November 17–24, 1930.

4 ad. ♂, 3 im. ♂, 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, November 26–December 8, 1930.

1 ad. – (= ♀), Brazil, São Gabriel, Rio Negro, January 13, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Durutomoni, February 19, 1931.

3 ad. ♂, 1 im. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 4–25, 1931.

Carriker (Proc. Acad. Nat. Sci. Philadelphia, vol. 84, 1932, pp. 3–4) lists the present series in his material of *consobrina* in his review of the races of the spotted-backed antbird, and there is nothing new to be added to his remarks on the form. He incorrectly records 1 male and 3 females from Salto do Huá, whereas there are two of each sex. The Salto do Huá and Serra Imeri females are more ochraceous below than any of the others, as he says, but the difference is very slight.

HYLOPHYLAX PUNCTULATA PUNCTULATA (Des Murs): ***Des Murs' Spotted Antbird***

Rhopotera punctulata Des Murs, in Castelnau, Expédition dans les parties centrales de l'Amérique du Sud, pt. 7: Zoologie, sect. 1: Oiseaux, livr. 18, 1856, p. 53 ("Haut Amazone" = Pebas, north bank of Marañon, northeastern Peru, Hellmayr, Catalogue of the birds of the Americas, pt. 4, 1924, p. 311).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Maturacá, November 9, 1930.
1 ad. ♂, 1 im. ♂, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.
1 ad. ♂, Venezuela, Raudal Corocoro, below Playa de Candela, February 9, 1931.
3 ad. ♂, 2 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.
1 ad. ♀, Venezuela, near Cerro Cariche, Upper Orinoco, February 24, 1931.
1 ad. ♀, Venezuela, near Isla Temblador, Upper Orinoco, February 25, 1931.
1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

This bird appears to be absent from the Rio Negro itself, although it occurs along the Amajaú, an affluent of that stream below Barcellos, and on the Maturaca and the Casiquiare. Zimmer (Amer. Mus. Nov. No. 703, 1934, p. 1) notes that birds from Peru are the same as those from the upper Orinoco, the Casiquiare, and the Caura in southwestern Venezuela, "although there is a wide gap in their distribution which avoids northwestern Brazil."

HYLOPHYLAX POECILINOTA DUIDAE Chapman: ***Rio Negro Scale-backed Antbird***

Hylophylax lepidonota duidae Chapman, Amer. Mus. Nov., No. 86, 1923, p. 7 (foot of Mount Duida, Upper Orinoco, southern Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 10, 1930.
1 ad. ♀, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Rio Cauabury, November 3, 1930.
1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.
1 ad. ♂, 1 ad. ♀, 1 ad. – (= ♀), Brazil, Serra Imeri, near Salto do Huá, November 30–December 8, 1930.
2 ad. ♂, 3 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, Venezuelan border, November 17–24, 1930.
1 ad. ♂, 1 ad. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 im. ♂, Venezuela, Brazo Casiquiare, Buenos Aires, February 21, 1931.
10 ad. ♂, 10 ad. ♀, 1 im. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 20–April 25, 1931.

This fine series is identified in accordance with Zimmer's contention (Amer. Mus. Nov., No. 703, 1934, p. 4) that *duidae* is a recognizable race distinct from *lepidonota*, of which form only one specimen (a cotype), has been available for comparison. There is no appreciable difference between birds from the Rio Negro and the Brazo Casiquiare, on the one hand, and the Cerro Yapacana area on the Upper Orinoco on the other. Zimmer found that while *duidae* ranged from the western base of Mount Duida on the Rio Cucucunuma southward to the Casiquiare and to the Rio Negro, eastward to the vicinity of Santa Isabel, he recorded specimens from the Upper Orinoco (Nericagua) as typical *poecilinota*. Inasmuch as these Nericagua birds are *poecilinota* and our Yapacana birds are certainly *duidae*, and inasmuch as the two localities are only a little over a hundred miles apart, it would seem that we might have to return to the old specific concept that *poecilinota* is one species with a gray-breasted, gray-bellied female, and *lepidonota* is another (with *duidae* as a race) with a rufescent-tawny breasted and bellied female. The difference in the females is very great; the males are very similar. This is a condition of frequent occurrence, referred to by Hellmayr as "heterogynism," and need not be interpreted as an indication of conspecificity.

Through the kindness of Dr. Zimmer his series from Duida and Nericagua has been made available for comparison with our birds. There is no question that the present birds are of the same form as his *duidae* material. In the area to the south and southeast of Mount Duida the birds show a slight tendency to vary in the direction of *duidae*, although more of them are nearer to that form than to *poecilinota* and most of them are definitely typical *poecilinota*. The two probably meet somewhere near Nericagua, but it is quite possible that they may be found to overlap, in which case there would be no argument about the specific distinctness of the two.

MYRMOTHERA CAMPANISONA DISSORS Zimmer: *Zimmer's Ant-pitta*

Myrmothera campanisona dissors ZIMMER, Amer. Mus. Nov., No. 703, 1934, p. 11 (Río Casiquiare, Venezuela, right bank, opposite El Mercy).

SPECIMENS COLLECTED

2 ad. ♂, Brazil, Rio Maturacá, November 9–12, 1930.
1 im. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 20–25, 1930.
1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, December 6, 1930.
1 ad. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.
1 im. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

These birds bear out the characters of *dissors* as stated by Zimmer (*cit. supra*). The race is known from the Upper Orinoco area, the Casiquiare and the Rio Negro to southeastern Colombia and to the Lower Rio Madeira in northwestern Brazil.

GRALLARIA VARIA CINEREICEPS Hellmayr: ***Ash-headed Ant-pitta***

Grallaria varia cinereiceps HELLMAYR, Verh. zool.-bot. Ges. Wien, vol. 53, 1903, p. 218 (Marabitanas, Rio Negro).

SPECIMENS COLLECTED

1 ad.–, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 5, 1930.

1 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

As far as I have been able to ascertain from literature these are the first specimens of this race to be taken since the formerly unique type (female). Their measurements are as follows: ad. ♂ —wing 115.2, tail 39, culmen from base 30, tarsus 54.1 mm.; unsexed adult—wing 116.2, tail 39, culmen from base —, tarsus 50 mm. The unsexed bird has the chin and upper throat duskier and the small flecks on the upper abdomen also duskier than in the male.

These specimens agree with the characters of *cinereiceps*—bright ochraceous underparts, rufous-brown throat and foreneck (with the variation noted above), and rufescent sides of head. The back, however, is not russet brown as in the description of the type, but more olivaceous—dark Dresden brown.

GRALLARIA MACULARIA DIVERSA Zimmer: ***Napo Spotted Ant-pitta***

Grallaria macularia diversa ZIMMER, Amer. Mus. Nov., No. 703, 1934, p. 19 (Puerto Indiana, Río Amazonas, mouth of Río Napo, Peru).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.

This species is one of the few in which the Rio Negro birds are different from those of the Casiquiare and Upper Orinoco. The present form, ranging from northeastern Peru, north of the Amazon, eastward and northeastward to the Casiquiare and the vicinity of Mount Duida, is more brownish, less olivaceous above, with the shaft streaks of the mantle less noticeable, than in *G. m. paraensis*, which occurs from the Lower Amazon west to the right bank of the Middle Rio Negro. The species has not been found as yet in the gap between the Middle Rio Negro and the Casiquiare.

Family CONOPOPHAGIDAE: Ant-pipits

CORYTHOPIS TORQUATA SARAYACUENSIS Chubb: ***Amazonian Ringed Gnateater***

Corythopis torquata sarayacuensis CHUBB, Bull. Brit. Orn. Club, vol. 38, 1918, p. 48 (Sarayacu, eastern Ecuador).

SPECIMENS COLLECTED

1 ad. ♂, Brazil Salto do Huá, Venezuelan line, November 17, 1930.

3 ad ♂, 3 im. ♂, 3 ad. ♀, 1 im. ♀, 2 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 3–28, 1931.

The unsexed immature bird has the pectoral markings dark brownish olive instead of black and has the entire breast and abdomen streaked with the same. The other supposedly immature birds are like the adults; in fact two of them were noted as having enlarged gonads although they were marked "immature." A number of the April birds were in breeding condition when collected.

Family COTINGIDAE: Chatterers

PHOENICIRCUS NIGRICOLLIS Swainson: ***Black-necked Red Chatterer***

Phoenicircus nigricollis SWAINSON, *in* Richardson, Fauna Boreali-Americana, vol. 2, 1832, p. 491 (based on *Ampelis carnifex* Spix, Avium species novae . . ., Brasiliam . . . , vol. 2, p. 4, pl. 5: Barcellos, Rio Negro).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 16, 1930.

This specimen is very slightly darker above than a comparative series of females in the American Museum of Natural History.

COTINGA COTINGA (Linnaeus): ***Purple-breasted Cotinga***

Ampelis cotinga LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 298 (based on "Le Cotinga" Brisson: "Brésil").

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Serra Imeri, Venezuelan border, December 3, 1930.

This specimen is unusually small, having a wing length of only 96 mm. Four males from British Guiana and two from Diamantina, near Santarém, Brazil, have wings of from 104–111 mm. A male from Camanãos, Rio Negro, in the American Museum of Natural History, has a wing length of 101 mm. Further material is needed to determine whether or not the Rio Negro population is constantly small.

COTINGA CAYANA (Linnaeus): ***Cayenne Cotinga***

Ampelis cayana LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 298 (based on "Le Cotinga de Cayenne" Brisson: Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 10, 1930.

1 ad. ♂, 1 ad. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 30–31, 1931.

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

Comparison of these 4 specimens with 10 others from British Guiana, Brazil, and Peru suggests that the species is unusually variable in size. Males from British Guiana (4) have wing lengths of 106–113.4 mm.; Amazonian and southern Venezuelan males (4) measure 105.2–112 mm., while a single male from the headwaters of the

Huallaga River, Peru, has a wing length of 120.5 mm. I have seen no females from Peru.

However, in response to a request, Dr. J. T. Zimmer has supplied additional mensural data that show that the Peruvian birds are not all large; his specimens from that country have wing lengths of 113–116 mm., while one of his Guianan birds is just as big as our Peruvian one, with a wing length of 120.5 mm.

XIPHOLENA PUNICEA (Pallas): ***Pompadour Chatterer***

Turdus puniceus PALLAS, *in* Vroeg's Catalogus, Adumbratiunculae, 1764, p. 2 ("Zuyd America"; restricted by Hellmayr, Catalogue of the birds of the Americas, pt. 6, 1929, p. 109, to Surinam).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, November 28, 1930.

1 im. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.

Both examples are in fairly fresh plumage. Study of comparative material indicates that the juvenal remiges are either retained in the first adult (nonbreeding) plumage or that they are not shed until the very end of the postjuvenal molt. Thus, a male from British Guiana is in adult plumage except for the remiges which still are very extensively dusky instead of white merely tipped with dusky as in the adults.

ATTILA SPADICEUS SPADICEUS (Gmelin): ***Polymorphic Attila***

Muscicapa spadicea GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 937 (based on "Yellow-rumped Flycatcher" Latham, A general synopsis of birds, vol. 2, pt. 1, p. 354: Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Serra Imeri, Salto do Huá, Venezuelan border, December 4, 1930.

The specimen is in the brown phase with no green or yellow on the throat and breast. It is in fairly fresh plumage.

ATTILA CITRINIVENTRIS Sclater: ***Citron-bellied Attila***

Atilla citriniventris SCLATER, Proc. Zool. Soc. London, 1859, p. 40 (Río Ucayali, eastern Peru).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 7, 1930.

1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, Venezuelan border, November 18, 1930.

2 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 29–April 27, 1931.

I am not aware of any published records from Venezuela prior to the Cerro Yapacana examples listed above.

Inasmuch as this species is still rather rare in collections, and not too well known, it may be well to append the measurements of the specimens obtained. The four males have wing lengths of from 85.0–88.1 (85.9); tail 63.2–67.2 (65.2); culmen from the base 22.1–23.5 (23.0 mm.).

ATTILA CINNAMOMEUS CINNAMOMEUS (Gmelin): ***Cinnamomeous Attila***

Muscicapa cinnamomea GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 937, (based on "Cinnamon Flycatcher" Latham, A general synopsis of birds, vol. 2, pt. 1, p. 354: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 14, 1931.

The female is slightly paler above than the male.

PSEUDATTILA PHOENICURUS (Pelzeln): ***Rufous-tailed Attila***

Attila phoenicurus PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 96, 171 (banks of the Rio Parahyba near Mattodentro (São Paulo) = Mattodentro, Hellmayr, Catalogue of the birds of the Americas, pt. 6, 1929, p. 144).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 27, 1931.

This specimen is the first to be recorded from Venezuela and extends the known range of the species northward by a long distance. Previously it was known from southern Brazil (Matto Grosso, São Paulo, Goyáz, and Paraná) north to the Rio Madeira (Rosarinho) and the Rio Tapajóz (Tanary).

Our specimen has been compared with two males and a female in the American Museum of Natural History. The female in that collection (from Tanary, Rio Tapajóz) is slightly darker, more richly tawny-rufescent below than is the Venezuelan one, but it may be not fully adult, as it has a narrower, more pointed outermost primary than does our specimen.

Females appear to have darker, more blackish, less reddish brown bills (in dried skins) than do males.

Because of the rarity of this species in collections, the measurements of the material seen are here appended. Males (Chapada-Matto Grosso, and Rosarinho, Rio Madeira)—wing 89.5, 89; tail 76, 77; culmen from base 20, 21 mm.; females (Cerro Yapacana and Tanary)—wing 90, 88; tail 75.5, 77; culmen from base 21, 20 mm.

LANIOCERA HYPOPYRRHA (Vieillot): ***Cinereous Mourner***

Ampelis hypopyrra VIEILLOT, Nouv. Dict. Hist. Nat., nouv. éd., vol. 8, 1817, p. 164 ("la Gujane" = Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 5, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

2 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Río Orinoco, March 20–April 9, 1931.

Zimmer's observations on the plumages of this species (Amer. Mus. Nov., No. 893, 1936, pp. 8–10) are borne out by the present series and other examples examined. On the basis of his contention that the orange-rufous patch on the belly with the feathers tipped with black is a sign of immaturity, our specimen from São Gabriel would have to be considered as subadult. This one and the Brazo Casiquiare example have the colored tufts on the upper flanks yellow; the four from farther north have them orange-tawny, but this is apparently an individual and not a geographic variation. Zimmer found no geographic correlation to the variations of this character.

RHYTIPTERNA SIMPLEX FREDERICI (Bangs and Penard): ***Amazonian Grayish Mourner***

Lipaugus simplex frederici Bangs and Penard, Bull. Mus. Comp. Zool., vol. 62, 1918, p. 71 (vicinity of Paramaribo, Surinam).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 12, 1931.

2 ad. ♀, Brazil, Cucuhy, Rio Negro, February 3, 1930.

There is considerable variation in even so small a series as three females. One of the Cucuhy birds is noticeably less yellowish green below and above, more sooty generally, than the other or the São Gabriel bird. It also has the gonydeal angle of the mandible paler than in the other two specimens. All the specimens are in abraded plumage.

An additional specimen was taken at Chapozoa, on the Brazo Casiquiare, Venezuela, January 30, 1931, and was preserved in alcohol.

LIPAUGUS CINERACEUS (Vieillot): ***Gray Screaming Piha***

Ampelis cineracea Vieillot, Tabl. Enc. Méth., Orn., vol. 2, livr. 91, 1822, p. 761 (based on "Le Cotinga cendré" Levaillant: Cayenne).

SPECIMENS COLLECTED

4 ad. ♂, Brazil, Rio Negro, at mouth of Rio Cauabury, October 21, 1930.

1 ad. ♀, Brazil, Cachoeira Thomaz, Rio Cauabury, October 27, 1930.

3 ad. ♂, Brazil, Cucuhy, Rio Negro, February 1–8, 1930.

1 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, November 19, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 6, 1931.

1 ad. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♀, Venezuela, Raudal Corocoro, Brazo Casiquiare, below Playa de Candela, February 9, 1931.

1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, February 28, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13, 1931.

1 ad. ♂, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 3–6, 1931.

A number of the specimens collected in October, November, and February were found to be in breeding condition at the time; some of those taken in January, February, and April show signs of molting; one obtained in March is in very worn plumage but shows no trace of molt.

Apparently a common bird in the Upper Rio Negro and the Upper Orinoco Basins.

Two additional specimens, taken at Salta do Huá, November 19–21, 1930, were preserved in alcohol.

PACHYRAMPHUS RUFUS (Boddaert): ***Cinereous Becard***

Muscicapa rufa Boddaert, Table des planches enluminéez . . . , 1783, p. 27 (based on "Le Gobe-mouche roux de Cayenne" Daubenton, Planches enlumineés . . . , pl. 453, fig. 1: Cayenne.)

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, September 26, 1930.

1 ad. ♀, Venezuela, Soledad, Anzoátegui, December 4, 1929.

The male has an unusually short wing (61.5 mm. as compared with 65.3–69 in other examples from Cayenne, Panama, Venezuela, and Colombia) and also a short tail (44 mm. as compared with 44–51 mm. in the other specimens seen). The female, on the other hand, is quite large (wing 68.3; tail 50.2 mm.). The male is not in molt and seems to have all its feathers.

PACHYRAMPHUS POLYCHROPTERUS NIGER (Spix): ***Black-bellied Becard***

Pachyrhynchus niger Spix, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 33, pl. 45, fig. 1 (no locality stated; "Amazonas, prope Fonteboa" designated by Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 56).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, January 4, 1930.

Puerto Ayacucho and Mount Duida appear to be about as far north in Venezuela as this race occurs, its place being taken in the more northern parts of the country by *P. p. tristis*. Two females of the latter race, from El Sombrero, Guárico, Venezuela, are slightly yellower, less washed with olive-green, below than the present example of *niger*, and have somewhat more tapering bills (seen from above), and are slightly smaller (wing shorter).

This is one of a number of species that has an Orinocoan race and an Amazonian race (or even more than one in Amazonia) but where the Amazonian-Rio Negro form extends into the upper drainage basin of the Orinoco; in other words, where the racial change takes place within the Orinocoan Basin, and not between the Orinocoan and the Amazonian systems.

The specimen is in fresh plumage.

PACHYRAMPHUS MARGINATUS NANUS Bangs and Penard: ***Dwarf Black-capped Becard***

Pachyrhamphus marginatus nanus Bangs and Penard, Bull. Mus. Comp. Zool., vol. 64, 1921, p. 395 (Xeberos, Peruvian Amazon, Peru).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 17, 1930.
1 im. –, Brazil, Cachoeira Manajó, Rio Cauabury, October 30, 1930.
1 im. ♀, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 6, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, December 30, 1930.
1 ad. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 22, 1931.

The measurements of the present series agree very well with those given by Hellmayr (Catalogue of the birds of the Americas, vol. 6, 1929, p. 187, footnote) for this race. Several of the specimens, distributed from October to April, were found to be in breeding condition when collected.

The nominate form differs in being larger and in having a somewhat more swollen bill. A female from Diamantina, near Santarém, Brazil, agrees with *nanus* in size but has a swollen bill like typical *marginatus*. It is considered as *nanus*, in agreement with the finding of Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 261) who refer Tapajóz birds to *nanus*. The Diamantina bird is pale above like the nominate race; it is really an almost exact halfway intermediate between the two races.

PLATYPSARIS MINOR (Lesson): ***Lesser Becard***

Querula minor Lesson, Traité d'ornithologie, livr. 5, 1830, p. 363 (Cayenne).

SPECIMENS COLLECTED

1 ♂, Brazil, Rio Cauabury, below mouth of Rio Maturacá, November 6, 1930.
1 ad. ♂, Brazil, Rio Maturacá, November 12, 1930.

The specimen from Rio Cauabury is molting into adult plumage from a juvenal dress resembling that of the female. The parts in adult feathering are the rosy gular patch, the sides and top of the head, the nape and interscapulars, and the median pair of rectrices.

The small comparative series examined bears out Hellmayr's contentions (Catalogue of the birds of the Americas, pt. 6, 1929, pp. 198–199, footnote) as to the great variability of the females.

TITYRA CAYANA CAYANA (Linnaeus): ***Cayenne Tityra***

Lanius cayanus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 137 (based on "La Pie-griesche grise de Cayenne" Brisson: Cayenne).

SPECIMENS COLLECTED

3 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, January 9–14, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 15, 1931.
1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 5, 1930.
1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

Some of the January birds were found to be in breeding condition when collected. None of the specimens obtained are in very worn plumage; the most abraded examples are January ones. Freshly

plumaged males are slightly more tinged with pale slate gray above than are birds with more worn feathering.

This is another of the many species that range from the Amazonian to the Orinocoan drainage basins without change.

TITYRA INQUISITOR ERYTHROGENYS (Selby): *Rufous-cheeked Tityra*

Psaris erythrogenys Selby, Zool. Journ., vol. 2, 1826, p. 483 ("Pernambucco"; corrected to Cayenne, French Guiana, by Hellmayr, Catalogue of the birds of the Americas, pt. 6, 1929, p. 220).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 5, 1930 and May 11–12, 1931.

One of the May birds was noted as being in breeding condition.

This species appears to be unknown from the Upper Rio Negro, a rather strange gap in its distribution as it occurs to the southeast, at Manáos, at the junction of the Negro and the Amazon and again to the southwest in eastern Peru (subsp. *albitorques*), and again to the north in the upper part of the Orinocoan system (*erythrogenys*).

PERISSOCEPHALUS TRICOLOR (Müller): *Capuchinbird*

Corvus tricolor Müller, Natursystem, Suppl., 1776, p. 85 (based on "Choucas chauvre de Cayenne" Daubenton, Planches enluminées . . ., pl. 521: Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.

As far as I have been able to learn, this is the first specimen of this bird recorded from the Casiquiare area of extreme southern Venezuela. Many years ago Wallace collected a specimen at Guia, on the Rio Negro, the nearest locality to the south of our present record, at which this bird has been taken, while a number of examples have been obtained at Mount Auyán-tepuí, the nearest locality to the east in southeastern Venezuela.

Our specimen has been compared with 27 others in the United States National Museum and the American Museum of Natural History and is the largest one seen. It has the following dimensions: Wing 236, tail 110, culmen from base 53, tarsus 45 mm. The next longest wing length, 223 mm., was found in a bird from Mount Auyán-tepuí (whence came also a male with a short wing of only 216 mm.). The tail length is almost matched by a bird from Faro, Amazon River, Brazil (109 mm.); the nearest culmen length to our bird's is a male from Faro, Brazil (50 mm.) and another from Paramaribo, Surinam (50 mm.). Our bird is not only the largest one seen but is also unusually richly colored, although it is matched in this respect by birds from Surinam and British Guiana. On the whole, it seems, strangely enough, that females are slightly more richly colored below, especially on the abdomen, than are males.

GYMNODERUS FOETIDUS (Linnaeus): *Bare-necked Grackle*

Gracula foetida LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 108 ("America, Rolander"=Surinam, *ex* Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 58).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.

The single specimen collected is in an interesting plumage that indicates that the fully adult plumage may take two or more years to acquire. Although considered as adult by the collectors, our specimen has very little of the silvery gray in the wings ordinarily considered characteristic of the adult male. In fact, this pale tone is restricted to external margins of the outermost five secondaries, where it is mottled with dusky earth brown, and to the tips of the feathers, where it is almost whitish, and to a few of the median upper primary coverts. The rest of the wings are dull black, the bird resembling the female more than the male, but differing from the female in having what gray it does have on the wings. The only explanation I can even guess at is that it is a bird in its second year and that the fully adult plumage is not acquired until the next year. It is also smaller than a male from the Amazon River and another from Elvira, eastern Peru. The wing lengths are—the Venezuelan bird 205; Amazon River bird 217; Peruvian bird 222 mm.

RUPICOLA RUPICOLA (Linnaeus): *Cock-of-the-rock*

Pipra rupicola LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 338 (based on "Rupicola" Brisson; "Surinam et toute la Guyani"; French Guiana, Hellmayr, Catalogue of the birds of the Americas, pt. 6, 1929, p. 242).

SPECIMENS COLLECTED

4 ad. ♂, 3 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, November 28–December 8, 1930.

1 ad. ♀, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.

4 ad. ♂, 3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 22–April 18, 1931.

The birds collected at Serra Imeri, Brazil, in November and December were in breeding condition.

The cock-of-the-rock is a bird of wide but spotty, local distribution. Hellmayr (op. cit., pp. 242–243) writes that it occurs in "mountain ranges of French, Dutch, and British Guiana, southern Venezuela . . . and northern Brazil . . ." It is a bird of the lower slopes only, a truly tropical species. Its preference for hilly country is more a preference for rocky cliffs and slopes than for altitude.

Holt (Nat. Geogr. Mag., Nov. 1933, pp. 621–622) writes as follows of his observations of this splendid bird: "It is a shy bird and has chosen for its haunts the occasional isolated hills and the lower mountain slopes of the Guiana highlands—a region little disturbed by

white men and only thinly populated by Indians. We obtained several additional specimens, and found one nest, very much like a robin's fastened to the bare face of a huge split boulder; but it was empty." He then describes the remarkable dance of this species (from the accounts of other observers): ". . . a score of birds of both sexes gather on the bushes surrounding an open space while a male goes through an extraordinary performance on the ground. While the audience cheers approvingly, the bird, with lowered wings and outspread pumping tail, walks round and round, scratching the ground and springing into the air. When it tires, another male takes its place. There seem to be no data as to the duration of these marathons."

Family PIPRIDAE: Manakins

PIPRITES CHLORIS TSCHUDII (Cabanis): ***Tschudi's Manakin***

Hemipipo tschudii CABANIS, Journ. für Orn., vol. 22, 1874, p. 99 (Ninabamba, Dept. Junín, Peru).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Brazil, Serra Imeri, near Salto do Huá, Brazil-Venezuela line, December 2–4, 1930.

Hellmayr (Catalogue of the birds of the Americas, pt. 6, 1929, pp. 6–7) records this race from the Upper Rio Negro, although noting that in that area it "passes gradually into *P. c. chlorion*." More recently Phelps (Bol. Soc. Venez. Cienc. Nat., No. 56, 1943, p. 309) records *tschudii* from western Venezuela (La Sabana). Bearing these records in mind, it seems best to refer the present specimens also to *tschudii*, especially so in the absence of comparative material. However, it may be mentioned that in his discussion of *P. c. chlorion* of northern Brazil from Manáos eastward to the Guianas, Hellmayr (*l. c.*, p. 5, footnote) writes that specimens from British Guiana "are conspicuous for their grayish hind neck and their uniform pale gray breast and abdomen, strongly contrasted with the yellow throat and tail coverts, while the rectrices are but indistinctly tipped with yellowish . . ." These remarks might well have been made of the present two birds except for the breast color, which is here definitely mixed with yellowish.

The immature bird has the lores brighter and more orange, less yellowish, and the chin and throat brighter yellow than the adult.

PIPRA CORONATA CARBONATA Todd: ***Coal-black Manakin***

Pipra carbonata TODD, Proc. Biol. Soc. Washington, vol. 38, 1932, p. 98 (Tocantins, north bank of Rio Solimões, Brazil).

SPECIMENS COLLECTED

2 ad. ♂, 2 ad. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 15–17, 1930.

1 ad. ♂, Brazil, Panela de Onca, Rio Cauabury, Amazonas, November 1, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, Rio Maturacá, Amazonas, November 9–11, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, November 20–24, 1930.
3 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, Brazil-Venezuela line, December 1-2, 1930.
6 ad. ♂, 3 ad. ♀, 1 im. –, Brazil, São Gabriel, Rio Negro, Amazonas, December 27, 1930–January 15, 1931.
2 ad. ♂, 1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 2–8, 1930.
1 ad, ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
1 ad. ♀, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.
1 ad, ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
A ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2–17, 1931.

The Venezuelan examples are very slightly smaller, and the females average slightly bluer, than the Brazilian specimens, but the differences are very slight indeed.

One of the January males from São Gabriel is molting into the black plumage.

Although no material of *P. c. hoffmansi* Hellmayr has been available for study, no variations toward the described characters of that form have been observed in the present series.

PIPRA SERENA SUAVISSIMA Salvin and Godman: ***Orange-bellied Manakin***

Pipra suavissima Salvin and Godman, Ibis, 1882, p. 79, pl. 1 (Merumé Mountains and Bartica Grove, British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 – [=ad. ♂], Brazil, Serro Imeri, near Salto do Huá, Brazil-Venezuela line, December 7, 1930.

These two specimens are more strongly tinged with orange on the abdomen than are a series of five from British Guiana, but the difference may be due to the great difference in the age of the specimens and the fact that the Guiana birds are not in too good condition. However, on the colored plate accompanying the original description the abdomen is represented as decidedly orange. This plate is a little misleading in that it shows no bluish posterior edging to the white coronal patch. This blue edging is found in specimens from British Guiana as well as in the present two. Chapman (Bull. Amer. Mus. Nat. Hist., vol. 63, 1931, p. 105) and Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 485) found that examples from Mounts Roraima, Duida, and Auyán-tepuí have richer orange underparts than others from British Guiana, but their Guianan birds, like those seen in the present study, were old.

PIPRA ERYTHROCEPHALA ERYTHROCEPHALA (Linnaeus): ***Golden-headed Manakin***

Parus erythrocephalus Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, p. 191 (Surinam).

SPECIMENS COLLECTED

2 ad. ♂, 1 [♀?] Brazil, Cucuhy, Rio Negro, February 4–8, 1930.

6 ad. ♂, 1 im. ♂, Brazil, Santa Isabel, Rio Negro, Amazonas, October 15–17, 1930.

1 im. ♂, Brazil, Rio Negro, mouth of Rio Cauabury, Amazonas, October 22, 1930.

2 ad. ♂, Brazil, Cachoeira Thomaz, Rio Cauabury, Amazonas, October 27, 1930.

1 im. ♀, Brazil, Serro Imeri, Rio Maturacá, Venezuelan border, near Salto do Huá, Venezuelan border, November 29, 1930.

5 ad. ♂, 4 im. ♂, 6 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, December 31, 1930–January 17, 1931.

1 ad. ♀, Venezuela, Colombian bank of Río Negro, opposite San Carlos, January 29, 1931.

2 ad. ♂, Chapazon, Brazo Casiquiare, January 30, 1931.

1 ad. ♂, 1 im. ♂, Venezuela, Raudal, San Sebastián, Brazo Casiquiare, February 1, 1931.

1 ad. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.

2 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco, San Antonio, March 4–5, 1931.

8 ad. ♂, 2 im. ♂, 8 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 30–April 25, 1931.

This fine series, together with a good number of specimens from the Guianas, the Lower Amazon, and Trinidad, bears out Hellmayr's contention (Catalogue of the birds of the Americas, pt. 6, 1929, p. 29, footnote) that further subdivision of this race appears to be impracticable. As a matter of fact, the race *berlepschi*, while recognizable, is not very trenchantly differentiated from the nominate form. Yet, on the other hand, there are some puzzling variations within the race. Thus, an adult male from Santa Lucia, Miranda, northern Venezuela, has a wing length of 63 mm.; an immature male from the same place 65 mm. All the other males examined, including the above listed birds, and others from other parts of the range have wing lengths of from 52–58 mm.; with an average of 55.1 mm. This is quite a striking difference. Another peculiar variational character is the color of the maxilla in adult males, this usually being light yellowish in dried skins, but in a number of instances from various parts of the range it is dusky brown. This is also true of immature males.

In addition to the skins listed above five birds were saved in alcohol, two from São Gabriel, January 10, 1931, and three from Chapazon Brazo Casiquiare, January 30, 1931.

PIPRA PIPRA PIPRA (Linnaeus): ***White-crowned Black Manakin***

Parus pipra Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, p. 190 (Surinam).

SPECIMENS COLLECTED

1 im. –, Brazil, Santa Isabel, Rio Negro, Amazonas, October 9, 1930.

1 ad. ♀, Brazil, Rio Cauabury, above Cachoeira Manajó, Amazonas, October 31, 1930.

1 ad. ♂, Brazil, Rio Maturacá, Amazonas, November 12, 1930.

2 ad. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, Brazil-Venezuela line, November 13–24, 1930.

5 ad. ♂, 1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, November 28–December 8, 1930.

1 ad. ♀, 1 im. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 3–12, 1931.

3 ad. ♂, Brazil, Cucuhy, Rio Negro, Amazonas, February 6–8, 1930.

10 ad. ♂, 4 im. ♂, 11 ad. ♀, 1 im. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 29–April 29, 1931.

One of the Cucuhy (February) birds is in molt. In the series from the Upper Orinoco, two of the immature males are in process of molting into the black adult plumage; the unsexed immature bird likewise shows a few blackish feathers on the throat and is therefore probably a male. These three birds are generally darker and more grayish than the adult females or the young female which they otherwise resemble.

In identifying these birds occasion was taken to reidentify all the specimens of the species available and Zimmer's account (Amer. Mus. Nov., No. 889, 1936, pp. 7–16) was found to hold for all the material (five races) seen.

An additional specimen, preserved in alcohol, was taken on the Rio Negro, February 9, 1930.

TELEONEMA FILICAUDA (Spix): *Cirrhate Manakin*

Pipra filicauda Spix, Avium species novae . . . Brasiliam . . . , vol. 2, 1825, p. 6, pl. 8, figs. 1, 2 (São Paulo de Olivença, Rio Solimões, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, below mouth of Rio Maturacá, Amazonas, November 6, 1930.

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.

1 im. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Rio Pacila, February 11–13, 1931.

1 im. ♀, Venezuela, Upper Orinoco, near Isla Temblador, February 25, 1931.

6 ad. ♂, 4 ad. ♀, 1 im. ♀, Venezuela, San Antonio, Upper Orinoco, February 28–March 2, 1931.

Two of the San Antonio males are really subadult birds just starting to molt into adult plumage.

No material from the Venezuelan coastal districts has been available for study; Hellmayr's decision (Catalogue of the birds of the Americas, pt. 6, 1929, p. 39, footnote) that *T. f. subpallida* Todd is not separable from typical *filicauda* has been followed in using a binomial in this report.

XENOPIPO ATRONITENS Cabanis: *Black Manakin*

Xenopipo atronitens Cabanis, Arch. für Naturg., vol. 13, 1847, p. 235 (British-Guiana).

SPECIMENS COLLECTED

1 ad. ♂ [prob. ♀], Brazil, Santa Isabel, Rio Negro, Amazonas, October 13, 1930.

1 ad. ♂, Venezuela, Upper Orinoco, right bank, opposite Corocoro Island, March 14, 1931.

8 ad. ♂, 1 im. ♂, 2 ad. ♀, 2 ad. – [prob. ♀], Venezuela, Cerro Yapacana, Upper Orinoco, March 21–April 29, 1931.

1 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 15, 1931.

The present specimens appear to constitute an extension of known range of the species into the Upper Orinoco Basin. Previously the only Venezuelan records, as far as we have found, were from Mount Roraima. The species was known from the Rio Negro, in the adjacent portion of Brazil to the south.

This series agrees with birds from British Guiana examined in the present study.

TYRANNEUTES STOLZMANNI (Hellmayr): ***Stolzmann's Manakin***

Pipra stolzmanni HELLMAYR, Ibis, 1906, p. 44 (Marabitanas, Rio Negro, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Serra Imeri, Rio Maturacá, Brazilian–Venezuelan line, December 1, 1930.

2 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 14–16, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

4 ad. ♂, Venezuela, Cerro Yapacana, Río Orinoco, April 11–28, 1931.

The eight specimens average slightly brighter yellow on the underparts than a male from Santarém, or a female from Pará.

MANACUS MANACUS MANACUS (Linnaeus): ***White-bearded Manakin***

Pipra manacus LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 340 (Surinam).

SPECIMEN COLLECTED

1 ♀, Brazil, Manáos, Amazonas, September 26, 1930.

This specimen is identified to subspecies solely on geographic grounds as females are not racially diagnostic. Birds from Manáos have been identified as belonging to the nominate form by several recent investigators—Hellmayr, Zimmer, Pinto, and others.

MANACUS MANACUS INTERIOR Chapman: ***Upper Amazonian Manakin***

Manacus manacus interior CHAPMAN, Bull. Amer. Mus. Nat. Hist., vol. 33, 1914, p. 624 (Villavicencio, eastern Colombia).

SPECIMENS COLLECTED

5 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 14–17, 1931.

These specimens agree with others from Bogotá, Colombia, and with the description, and with the comments of recent authors. Judged by published records this race extends northward in the Caura Valley of Venezuela but not in that of the Upper Orinoco, where it is replaced by the next form, *M. m. umbrosus*.

MANACUS MANACUS UMBROSUS Friedmann: ***Orinoco Manakin***

Manacus manacus umbrosus FRIEDMANN, Proc. Biol. Soc. Washington, vol. 57, 1944, p. 99 (Cerro Yapacana, Upper Orinoco, Venezuela).

SPECIMENS COLLECTED

6 ad. ♂, 2 im. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 25–April 20, 1931.

This is the original series on which the description of this form was based. The Orinoco race differs from the Rio Negro form in being noticeably darker on the lower breast, abdomen, sides, flanks, thighs, and under tail coverts, and in having the white nuchal collar considerably suffused with grayish.

SCHIFFORNIS MAJOR DUIDAE Zimmer: ***Duida Manakin***

Schiffornis major duidae Zimmer, Amer. Mus. Nov., No. 889, 1936, p. 26 (right bank of Río Casiquiare, Venezuela, opposite El Merey).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

This specimen, which represents a small westward extension of the known range of this manakin, agrees with the description of the race in having the gray of the upper surface of the head with no definite rufescence on the concealed portions of the feathers and in having the upper back less rufescent, more brownish, than specimens of the nominate form (in this case the available material was from Hyutanahan, Rio Purús, Brazil). It has a visibly weaker bill as well, a character not mentioned by Zimmer, but possibly one that a larger series would show to be inconstant. The specimen has the chin and upper throat quite grayish, agreeing in this respect with Zimmer's observations on birds from Mount Duida and its immediate environs. The dimensions of this example are wing 82, tail 56, culmen from the base 14.2 mm. This is slightly larger than Zimmer's figures for the type as far as wing length is concerned (type 80 mm.) and shorter in the culmen length (type 16 mm.).

SCHIFFORNIS TURDINUS AMAZONUS (Sclater): ***Amazonian Manakin***

Heteropelma amazonum Sclater, Proc. Zool. Soc. London, 1860, p. 466 (Chamicuros, Río Huallaga, Peru).

SPECIMENS COLLECTED

1 im. –, Brazil, Salto do Huá, Rio Maturacá, Brazil-Venezuela line, November 23, 1930.

1 ad. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 16, 1931.

5 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 19–April 21, 1931.

No topotypical material has been available, but inasmuch as both Hellmayr (Catalogue of the birds of the Americas, pt. 6, 1929, p. 81) and, more recently Zimmer (Amer. Mus. Nov., No. 899, 1936, p. 24) list specimens from this area as agreeing with eastern Peruvian birds, there can be no doubt that they belong to this race. The develop-

ment of the tawny color on the throat is quite variable in the present series. None of the birds show any ventral pallor as in the more eastern, Lower Amazonian form, *wallacii*.

The range of the nominate race is given by Hellmayr as "eastern Brazil, in the southern section of the state of Bahia (exact limits unknown)"; Zimmer lists specimens from "Bahia," "Rio Janeiro," and "Brasilia." In view of the paucity of data it may be worth while to put on record an adult male taken at Pau Gigante, Espiritu Santo, May 9, 1940, by Ernest G. Holt. It is a very large individual (wing 98; tail 74; culmen from base 18.2 mm.). The definite knowledge of the occurrence of *turdinus* so far to the south argues for the specific distinctness of this species and *S. virescens*, as the latter is a bird of southeastern Brazil.

The seven males of *amazonus* show the following variation in size: Wing 84–89 (average 86.2); tail 60–64 (62); culmen from the base 15–17 (16.2 mm.).

NEOPELMA CHRYSOCEPHALUM (Pelzeln): ***Orange-crested Manakin***

Heteropelma chrysocephalum PELZELN, Zur Ornithologie Brasiliens, vol. 2, 1868 pp. 125, 185 (San Carlos, Río Guainia, Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, above Cachoeira Manajó, Amazonas, October 31, 1930.

1 ad. ♂, 1 ad. ♀, Brazil, Rio Cauabury, Amazonas, October 31–November 3, 1930.

3 ad. ♂, Brazil, Salto do Huá, Rio Maturacá, Brazil-Venezuela line, November 18–30, 1930.

4 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, Brazil, November 26–December 5, 1930.

3 ad. ♂, 1 ad. ♀, Brazil, Cucuhy, Rio Negro, Amazonas, February 1–6, 1930.

The first specimen listed above and one from Serra Imeri have the coronal patch yellow with hardly a trace of orange; all the other specimens have the orange color strongly developed.

The present series agrees with material from British Guiana.

HETEROCERCUS FLAVIVERTEX Pelzeln: ***Yellow-crowned Manakin***

Heterocercus flavivertex PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 125, 186 (Rio Negro, Marabitanas, Rio Xié, Rio Içana, Rio Vaupé, and Barcellos, Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 17, 1930.

2 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, Brazil-Venezuela line, November 19–21, 1930.

2 ad. ♀, Brazil, Rio Maturacá, below Salto do Huá, December 11, 1930.

9 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 9–17, 1931.

1 im. ♂, Brazil, Cucuhy, Rio Negro, Amazonas, February 4, 1930.

1 im. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.

1 im. ♀, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.

2 ad. ♂, 3 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 12–14, 1931.

1 ad. ♀, 1 im. –, Venezuela, San Antonio, Upper Orinoco, March 3–4, 1931.

1 ad. ♀, Venezuela, Cerro Uapacana, Upper Orinoco, April 3, 1931.

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 17, 1931.

This fine series suggests that it may be necessary to reinstate Berlepsch and Leverkuhn's name *angosturae* for the Venezuelan birds. Hellmayr (Catalogue of the birds of the Americas, pt. 6, 1929, p. 91, footnote) writes that "specimens from the upper Orinoco, including the type of *H. angosturae* are perfectly similar to Natterer's original series from the Rio Negro . . . " It is unfortunate that the type of *angosturae* is a female, inasmuch as there is no difference between Brazilian and Venezuelan birds in this sex. In the adult males, however, the Venezuelan birds (unfortunately only two, both from the right bank of the Upper Orinoco opposite Corocoro Island) are slightly darker, especially on the forehead, sides of crown, and occiput, than are Rio Negro examples. If more ample material should bear this out as a constant difference, we would have two races as follows: The typical one in the Rio Negro area of northern Brazil and *H. f. angosturae* in the upper Orinoco Basin, east to Mount Duida, in Venezuela.

Females are very variable in the amount of rufescence on the breast and abdomen.

Family TYRANNIDAE: Tyrant Flycatchers

KNIPOLEGUS ORENOCENSIS ORENOCENSIS Berlepsch: ***Orinoco Tyrant***

Cnipolegus orenocensis Berlepsch, Ibis, 1884, p. 433, pl. 12 (Angostura, Orinoco River, Venezuela).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, near Soledad, Anzoátegui, December 1, 1929.

The female is somewhat paler than a male from Altagracia, the only other specimen available for examination. Apparently an uncommon, or at least an uncommonly collected, species.

FLUVICOLA PICA PICA (Boddaert): ***White-shouldered Water-tyrant***

Muscicapa pica Boddaert, Table des planches enluminéez . . . , 1783, p. 42 (based on Daubenton, Planches enluminées . . . , pl. 675, fig. 1: Cayenne).

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 6, 1930.

This specimen still has the brownish juvenal dress on the back. The rump and upper tail coverts are broadly white, while the white shoulder patches of the adult are indicated by the white traces of the scapular and adjacent feathers, visible when the plumes are parted.

OCHTHORNIS LITTORALIS (Pelzeln): *Natterer's Water-tyrant*

Elainea littoralis PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 108, 180 (Cachoeira Guajará—guacú, Rio Mamoré; Cachoeira de Bananeira and Borba, Rio Madeira).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Camanãos, Rio Negro, December 23, 1930.
1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 14, 1931.
1 ad. ♀, Venezuela, Playa de Candela, Brazo Casiquiare, February 8, 1931.
1 ad. ♀, Venezuela, Brazo Casiquiare near Caño Mabinagui, February 20, 1931.

All four specimens are in very abraded feathering; the male has the tail worn to a stump (possibly partly owing to shot?) not much more than half its normal length. There appears to be great variation in the stage of plumage at the same time of the year as three adults from the Rio Purús, Brazil, taken between December 24 and February 7 are in fairly fresh plumage.

MACHETORNIS RIXOSA FLAVIGULARIS Todd: *Northern Fire-crowned Tyrant*

Machetornis rixosa flavigularis TODD, Ann. Carnegie Mus., vol. 8, 1912, p. 210 (Tocuyo, State of Lara, Venezuela).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Soledad, Anzoátegui, June 11, 1931.

The single example collected is in worn plumage. According to the collector's notes the bird was in breeding condition.

MUSCIVORA TYRANNUS TYRANNUS (Linnaeus): *Southern Fork-tailed Flycatcher*

Muscicapa tyrannus LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 325 (Surinam).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 10, 1930.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 8, 1931.
1 im. ♀, Venezuela, right bank Upper Orinoco, opposite Corocoro Island, March 12, 1931.

The male is in badly abraded plumage. All three specimens show the dark dorsal color of the southern race, which comes to our area as a migrant.

The type locality of this race was cited as Cayenne by Berlepsch and Hartert in 1902 (Nov. Zool., vol. 9, p. 52) but more recently has been restricted to Surinam by Zimmer (Amer. Mus. Nov., No. 962, 1937, p. 1), the latter seeming from the record to be the proper action. In the original description Linnaeus gives the habitat as "in Canada, Surinamo." He refers to Brisson's *Muscicapa Tyrannus cauda bifurca*, that author stating that he had seen specimens from Canada and Cayenne. Linnaeus, however, seems to have seen some material of his own, as he goes on to list two varieties or kinds as *Surinamensi* and *Canadensi* with color characters for each. He does not mention Cayenne.

MUSCIVORA TYRANNUS MONACHUS (Hartlaub): ***Hartlaub's Fork-tailed Flycatcher***

Tyrannus (*Milvulus*) *monachus* HARTLAUB, Rev. Zool., vol. 7, 1844, p. 214 (Guatemala).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.

This immature specimen is placed in this race because of the paler dorsal coloration it shows when compared with birds in a similar stage from the far south. Whether this race is resident or migrant in this region is still to be determined.

TYRANNUS MELANCHOLICUS MELANCHOLICUS Vieillot: ***Azara's Kingbird***

Tyrannus melancholicus VIEILLOT, Nouv. Dict. Hist. Nat., nouv. éd., vol. 35, 1819, p. 48 (based on Azara, No. 198: Paraguay).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Manáos, Amazonas, September 27, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 9–10, 1930.
1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 1, 1930.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Perro de Agua, February 18, 1931.
1 ad. ♂, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.
1 im. ♂, Venezuela, San Antonio, Upper Orinoco, February 28, 1931.
1 ad. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 15, 1931.
3 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 22–April 16, 1931.
2 ad. ♂, 2 ad. ♀, 1 ad. –, Venezuela, Puerto Ayacucho, Río Orinoco, May 12–20, 1931.

In identifying these specimens to the typical race, I am following the observations and conclusions reached by Zimmer (Amer. Mus. Nov., No. 962, 1937, 14–21) on the basis of an enormous series of some 750 specimens, rather than Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, pp. 106–107). Hellmayr's arrangement would lead us to call the present examples *T. m. despotes*. Zimmer truly says that the taxonomy of this species is still not very clear. Thus, the present birds have the pectoral area as in *despotes* in some individuals, and more grayish, as in the nominate form, in others. A male from Santa Isabel is the largest and darkest bird of the whole series, different enough to make one wonder if further "splitting" of the form may not some day be found advisable.

TYRANNUS MELANCHOLICUS CHLORONOTUS Berlepsch: ***Berlepsch's Kingbird***

Tyrannus chloronotus BERLEPSCH, Ornis, vol. 14, 1907, p. 479 (Temax, Yucatán).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Ciudad Bolívar, November 25, 1929.

This specimen agrees with *chloronotus* in the pallor of the crown and anterior throat but is otherwise not very different from the nominate race, the pectoral coloration agreeing with several of the specimens of *T. m. melancholicus* recorded in this report. It may be noted in

support of the present identification that Zimmer (Amer. Mus. Nov., No. 962, 1937, p. 21) records *chloronotus* from Ciudad Bolívar as well.

EMPIDONOMUS VARIUS RUFINUS (Spix): ***Amazonian Varied Flycatcher***

Muscicapa rufina Spix, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 22, pl. 31 ("in provincia fl. Amazonum").

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Manáos, Amazonas, September 26, 1930.

This example agrees with specimens from Bahia but is slightly darker on the sides of the breast.

LEGATUS LEUCOPHAIUS LEUCOPHAIUS (Vieillot): ***Striped Flycatcher***

Platyrhynchos leucophaius Vieillot, Nouv. Dict. Hist. Nat., nouv. éd., vol. 27, 1818, p. 11 ("l'Amérique meridonale" = Cayenne).

SPECIMENS COLLECTED

2 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, December 31, 1930–January 1, 1931.
1 ad. ♂, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 2, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

The two Brazilian examples have the superciliaries and their connecting occipital band noticeably paler and broader than do the Venezuelan specimens. A series of some 25 birds from Brazil to Costa Rica, however, shows sufficient variability in this regard to make it seem an unlikely geographic character. The two Brazilian birds are in somewhat fresher plumage than the Venezuelan ones. The latter two are very similar to a skin from Cayenne (topotypes).

MYIODYNASTES MACULATUS MACULATUS (P. L. S. Müller): ***Streaked Flycatcher***

Muscicapa maculata P. L. S. Müller, Natursystem, Suppl., 1776, p. 169 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 9, 1930.

This example has the heavily streaked breast and the dark coloration characteristic of the nominate subspecies. The dorsal surface is browner than in *M. m. solitarius*.

MEGARHYNCHUS PITANGUA PITANGUA (Linnaeus): ***Boat-billed Flycatcher***

Lanius pitangua Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 136 (based on Brisson; eastern Brazil).

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 20–21, 1931.

The young male has a bill not much more than half as long as that of the adult but fully as broad. Its future growth is apparently chiefly a matter of increase in one direction.

The adult is in very worn feathering.

CORYPHOTRICCUS PARVUS PARVUS (Pelzeln): ***Lesser Yellow-crowned Flycatcher***

Pitangus parvus PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 111, 181 (Marabitanas, Rio Negro).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 29, 1931.

As far as I have been able to learn, this is the first specimen of this flycatcher recorded from Venezuela. It is slightly darker on the back than an adult female from British Guiana, which it otherwise resembles.

MYIOZETETES CAYANENSIS RUFIPENNIS Lawrence: ***Lawrence's Rufous-winged Flycatcher***

Myiozetetes rufipennis LAWRENCE, Ann. Lyc. Nat. Hist. New York, vol. 9, 1869, p. 267 (Valencia, Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare near Mabinagui, February 20, 1931.
1 im. –, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 14–16, 1931.

These specimens are not typical *rufipennis* but are intermediate between it and true *cayanensis*. They seem, however, to be slightly closer to *rufipennis* and are therefore considered as variants of this race. The immature bird has no coronal patch and has the edges of the outer upper wing coverts as rufescent as in an adult *rufipennis* from northern Venezuela (Ocumare de la Costa), while the adults have practically no rufescent tinge on the margins of these feathers. Geographically, as well as in coloration, these birds are intermediate between the two races. Typical *cayanensis* has been recorded from the Rio Branco (Boa Vista), not very far to the east, and *rufipennis* is stated by Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, p. 139) to occur from the north coast of Venezuela south to the Orinoco Valley. Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 486) records *cayanensis* from southern Venezuela, farther to the east (Río Guarapiche, Mount Auyán-tepuí, and Mount Roraima).

MYIOZETETES SIMILIS SIMILIS (Spix): ***Vermillion-crowned Flycatcher***

Muscicapa similis SPIX, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 18 (Amazon River).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Manáos, September 29, 1930.

Manáos is fairly close to the northern limit of the range of this subspecies. Zimmer (Amer. Mus. Nov., No. 963, 1937, p. 21) records examples from Campos Salles and Manáos.

MYIOZETETES SIMILIS COLUMBIANUS Cabanis and Heine: ***Colombian Vermillion-crowned Flycatcher***

Myiozetetes columbianus CABANIS and HEINE, Museum Heineanum, vol. 2, 1859, p. 62 (Puerto Cabello, Venezuela, and Cartagena, Colombia).

SPECIMENS COLLECTED

1 ad. ♂, Ciudad Bolívar, Venezuela, June 8, 1931.
1 ad. ♀, Soledad, Anzoátegui, Venezuela, June 11, 1931.

Both specimens are in rather worn feathering. This race is noticeably smaller and paler than the nominate form.

MYIOZETETES LUTEIVENTRIS (Sclater): ***Orange-vented Flycatcher***

Elaenia luteiventris SCLATER, Proc. Zool. Soc. London, 1858, p. 71 (Río Napo, Ecuador).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, December 30, 1930–January 9, 1931.
1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 2, 1930.

These specimens agree in coloration and size with 15 others from Brazil, Colombia, Ecuador, and Peru, kindly lent me by Dr. J. T. Zimmer. Males average slightly larger than females: Wing, males 73.4–78 (75.8); females 66–75 (73.3 mm.).

This flycatcher does not range north across into the Orinoco drainage.

TYRANNOPSIS SULPHUREA (Spix): ***Sulphury Flycatcher***

Muscicapa sulphurea SPIX, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 16, pl. 20 (Brazil).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, September 26, 1930.
1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 16, 1930.
1 ad. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 31, 1931.

Through the kindness of the authorities of the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia, and the Carnegie Museum, I have been able to assemble a series of some 87 specimens from Brazil, the three Guianas, Venezuela, and Trinidad.

Only two Trinidad birds, both females, have been seen (one from Aripa Savanna and one from La Brea), but both have broader, longer, and generally stouter bills than any of the continental birds and may represent a distinct, insular subspecies. According to Belcher and Smooker (Ibis, 1937, p. 233) this flycatcher is very rare and local in Trinidad. More material is necessary to determine the status of the local form. It is only in the bill that the two specimens are unusual; in all other parts they are matched by birds from various parts of the continental range of the species. There are no geographic variations among the continental birds.

PITANGUS SULPHURATUS RUFIPENNIS (Lafresnaye): ***Rufous-winged Flycatcher***

Saurophagus rufipennis LAFRESNAYE, Rev. Mag. Zool., vol. 3, 1851, p. 471 (Caracas).

SPECIMENS COLLECTED

3 ad. ♀, 2 im. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, January 4, 1930, and May 8–19, 1931.

1 ad. ♂, Venezuela, Soledad, Anzoátegui, December 4, 1929.

The birds from Puerto Ayacucho have the rufous margins of the remiges and their upper outer coverts slightly narrower than does the example from Soledad but are definitely nearer to *rufipennis* than to the nominate subspecies which occurs to the south in the valley of the Rio Negro. This is in keeping with Zimmer's observation (Amer. Mus. Nov., No. 963, 1937, p. 25) that "two specimens from Ayacucho (Río Orinoco), Venezuela, are far from typical *rufipennis* although they appear to represent the extreme of variation in that form in the direction of *sulphuratus*."

PITANGUS SULPHURATUS SULPHURATUS (Linnaeus): ***Bemtevi***

Lanius sulphuratus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 137 (based on Brisson, Ornithologia . . ., vol. 2, 1760, p. 176, pl. 16: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, September 29, 1930.

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 10, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 16, 1931.

This form has much narrower rufescent edges on the remiges and their outer upper coverts and is also darker on the back than the preceding race.

MYIARCHUS TYRANNULUS TYRANNULUS (Müller): ***Guianan Crested Flycatcher***

Muscicapa tyrannulus Müller, Natursystem, Suppl., 1776, p. 169 (based on Daubenton, Planches enluminées . . ., pl. 571, fig. 1: Cayenne).

SPECIMENS COLLECTED

1 im. ♀, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.

2 ad. ♂, 2 ad. ♀, 1 im. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 11–16, 1931.

1 ad. ♂, Venezuela, Soledad, Anzoátegui, November 29, 1929.

1 ad. ♂, Venezuela, Laguna Icacal, Estado Bolívar, December 8, 1929.

The November and December birds are in fresh plumage; the March and May ones are much abraded.

Zimmer (Amer. Mus. Nov., No. 994, 1938, pp. 1–3) has concluded that *chlorepiscius* is not separable from the nominate race in spite of local variations. This is borne out by the material examined in the present study.

MYIARCHUS SWAINSONI SWAINSONI Cabanis and Heine: ***Sordid Flycatcher***

Myiarchus swainsoni Cabanis and Heine, Museum Heineanum, vol. 2, 1859, p. 79 (Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Venezuela, Bolívar, June 8–10, 1931.

These two birds are apparently migrants from the south. Both are in worn plumage, the adult showing active molt in the tail.

That this form, breeding in Paraguay to southeastern Bolivia and southeastern Brazil, migrates north to Venezuela has been recorded by Zimmer (Amer. Mus. Nov., No. 994, 1938, p. 4 and 8).

MYIARCHUS SWAINSONI PHAEONOTUS Salvin and Godman: ***Whiteley's Flycatcher***

Myiarchus phaeonotus SALVIN and GODMAN, Ibis, 1883, p. 207 (Merumé Mountains, British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Tamatama, Upper Orinoco, Februrary 23, 1931.

2 ad. ♂, 3 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 25–April 16, 1931.

The two specimens from Tamatama are not typical but are intermediate between *phaeonotus* and *amazonus*, being somewhat less sooty above and more yellowish in the abdomen than in the Cerro Yapacana birds.

It is still an unsolved question as to whether *swainsoni* and *ferox* are species, each with its own races, or are more closely related. Todd's revision (Proc. Biol. Soc. Washington, vol. 35, 1922, pp. 181–217) of the genus presents conclusions quite at variance with those of Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, pp. 158–187) and both differ from those of Zimmer (Amer. Mus. Nov., No. 994, 1938, pp. 1–26). For one working with a different series of specimens the points of agreement and of difference in these three reviews are exceedingly difficult to harmonize; let it be said that Zimmer's review has been taken as the most recent comprehensive study in guiding the identifications here used, but I have no feeling of certainty that *ferox* and *swainsoni* are really specifically distinct.

The Cerro Yapacana birds agree very well with material from Mount Duida.

MYIARCHUS FEROX FEROX (Gmelin): ***Fierce Flycatcher***

Muscicapa ferox GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 934 (primarily based on "Le Tyran, de Cayenne" Brisson, Ornithologia . . ., vol. 2, p. 398: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, September 29, 1930.

1 im. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 15, 1931.

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 16, 1931.

3 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 12–20, 1931, and January 8, 1930.

Two of the Puerto Ayacucho examples have the gray of the breast much suffused with buff and pale olive-tawny.

Hellmayr (Catalogue of the birds of the Americas, vol. 5, 1927, p. 177) suggests that the birds of southern Venezuela, which would

include all these specimens, except the Manáos bird, are not separable from *australis* of Argentina, Bolivia, and southern Brazil. This is not corroborated by comparative material at hand; the southern birds (*australis*) are paler above. On the basis of geography it would be surprising if southern Venezuela was inhabited by the same form as Argentina, etc., since the typical race intervenes between the two areas.

Recently Zimmer and Phelps (Amer. Mus. Nov., No. 1312, 1946, p. 11) have described a more brownish-backed race, *M. f. brunnescens*, from the Apure River, and along the Orinoco from Altagracia to Puerto Ayacucho and across westward to Villavicencio. According to this all the above birds except the one from Manáos would be *brunnescens*, but I cannot see the characters of this race constantly enough in this material to feel that they are really *brunnescens* and not *ferox* varying in that direction. Two of the five birds are browner than the other three.

MYIARCHUS TUBERCULIFER TUBERCULIFER (Lafresnaye and D'Orbigny): ***D'Orbigny's Dusky-capped Flycatcher***

Tyrannus tuberculifer LAFRESNAYE and D'ORBIGNY, Synopsis avium . . ., pt. 1, *in* Mag. Zool., vol. 7, cl. 2, 1837, p. 43 (Guarayos, Bolivia).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Negro, October 4, 1930.
1 ad. ♀, Venezuela, Puerto Ayacucho, Amazonas, January 4, 1930.

In view of what Zimmer has written (Amer. Mus. Nov., No. 994, 1938, pp. 19–20) about the possible validity of *coalei* I have compared the present birds with the type of *coalei* and with examples from northern Venezuela and from Santa Marta, Colombia. There are no constant differences between them, and so the current allocation of *coalei* in the synonymy of typical *tuberculifer* holds.

CNEMOTRICCUS FUSCATUS FUMOSUS (Berlepsch): ***Guianan Dusky Flycatcher***

Empidochanes fuscatus fumosus BERLEPSCH, Nov. Zool., vol. 15, 1908, p. 108 (Cayenne, French Guiana).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Fazenda Marinha, São Joaquim, Estado do Pará, September 18, 1930.

The single specimen of this dusky billed, generally dark form is in worn plumage.

CNEMOTRICCUS FUSCATUS CABANISI (Léotaud): ***Léotaud's Dusky Flycatcher***

Empidonax cabanisi LÉOTAUD, Oiseaux de l'Isle de la Trinidad, 1866, p. 232 (Trinidad).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Laguna Icacal, near Ciudad Bolívar, December 8, 1929.

This race is more olivaceous, less brownish, above than any of the other forms of this species.

Zimmer (Amer. Mus. Nov., No. 994, 1938, p. 30) suggests that *cabanisi* may have to be "split" into two or possibly three races—*vireoninus* Ridgway of Tobago, and another, for which no name is already available, from the upper stretches of the Orinoco. Material is not available to do more than again call attention to this possibility. A specimen was collected at San Antonio, on the Upper Orinoco, March 4, 1931, but was preserved in alcohol, rendering it quite useless for subspecific determination.

CNEMOTRICCUS FUSCATUS DUIDAE Zimmer: ***Duida Dusky Flycatcher***

Cnemotriccus fuscatus duidae ZIMMER, Amer. Mus. Nov., No. 994, 1938, p. 30 (Playa del Río, Base, Mount Duida, Venezuela, altitude 550 feet).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá (Brazilian-Venezuelan border), November 17, 1930.

1 im. ♂, Brazil, Cucuhy, Rio Negro, February 6, 1930.

The immature bird is paler and tawnier above than are the adults. The adult male is considerably darker than the female.

TERENOTRICCUS ERYTHRURUS VENEZUELENSIS Zimmer: ***Venezuelan Red-tailed Flycatcher***

Terenotriccus erythrurus venezuelensis ZIMMER, Amer. Mus. Nov., No. 1042, 1939, p. 6 (Esmeralda, Mount Duida, Venezuela; altitude 325 feet).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.

1 ad. ♀, Venezuela, San Carlos, Río Negro, Amazonas, January 28, 1931.

2 ad. ♂, 1 im. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 30–31, 1931.

1 im. ♂, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.

2 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.

1 im. ♂, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 19, 1931.

This race is more grayish on the top of the head and the back, and slightly paler below than is *T. e. signatus* of eastern Ecuador and northeastern Peru, the subspecies most like it in color. It ranges from the upper stretches of the Rio Negro and the Rio Uaupes, Brazil, to southern Venezuela in the valleys of the Upper Orinoco and Caura Rivers and to Mount Duida.

MYIOBIUS BARBATUS BARBATUS (Gmelin): ***Whiskered Myiobius***

Muscicapa barbata GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 933 (based on Daubenton, Planches enluminées . . ., pl. 830, fig. 1: Cayenne).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, Amazonas, November 2, 1930.

2 ad. ♀, 1 ad. –, Brazil, Salto do Huá, Rio Maturacá, Brazilian-Venezuelan border, November 17–23, 1930.

1 im. ♂, Brazil, Serra Imeri, near Salto do Huá, Brazilian-Venezuelan border, November 28, 1930.

1 im. ♂, 1 ad. ♀, Brazil, Cucuhy, Rio Negro, Amazonas, February 8, 1930.

1 ad. –, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.

1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 1, 1931.

On geographical grounds these specimens should be of the nominate race, with the description of which (no comparative material being available) they agree except in that the chin and upper throat are not as yellowish as the description calls for. Thus, Todd (Proc. Biol. Soc. Washington, vol. 35, 1922, p. 25) describes this area as deep colonial buff, whereas the present specimens are deep olive-buff on these parts.

Another specimen from the Rio Negro, February 2, 1930, was preserved in alcohol.

HIRUNDINEA FERRUGINEA FERRUGINEA (Gmelin): ***Black-tailed Swallow-flycatcher***

Todus ferrugineus Gmelin, Systema naturae, vol. 1, pt. 1, 1788, p. 446 (based on "Ferruginous-bellied Tody" Latham, A general synopsis of birds, vol. 1, pt. 2, p. 662: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, 1,800 feet, March 20–22, 1931.

These specimens agree with a male from British Guiana. The female has the chin and upper throat more whitish than the male. Apparently these are the first examples of the form reported from the upper Orinoco, the previous Venezuelan records being from Mounts Duida, Auyán-tepuí, and Roraima, in the tropical and subtropical zones (1,100–2,400 meters on Auyán-tepuí).

ONYCHORHYNCHUS CORONATUS CASTELNAUI Deville: ***Castelnau's Royal Flycatcher***

Onychorhynchus castelnaui Deville, Rev. Mag. Zool., ser. 2, vol. 1, 1849, p. 56 (mission de Sarayacu, Pampa del Sacramento, Peru).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Serra Imeri, Brazil-Venezuela border, December 3, 1930.

In identifying the lone example secured, I am guided by Zimmer's statement (Amer. Mus. Nov., No. 1043, 1939, pp. 6–7) that birds from "the uppermost reaches of the Rio Negro in Brazil, and the adjacent portion of the Cassiquiare in Venezuela, are not quite typical but are . . . decidedly closer to *castelnaui* than to *coronatus* . . ." The present example has the small size of *castelnaui* (wing 75; tail 61 mm.) but has the upper tail coverts barred as in typical *coronatus*. It is

therefore an intermediate and is placed with *castelnaui* because of Zimmer's observation on his material.

PLATYRINCHUS SATURATUS Salvin and Godman: ***Cinnamon-crested Flatbill***

Platyrhynchus saturatus SALVIN and GODMAN, Ibis, 1882, p. 78 (Merumé Mountains, British Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, Amazonas, November 3, 1930.
1 ad. ♂, Brazil, Rio Maturacá, Amazonas, Novmber 9,1930.

The only previous records for this flatbill on the upper Rio Negro seem to be two birds from Tatú and Mount Curicuriari, recorded by Zimmer (Amer. Mus. Nov., No. 1043, 1939, p. 9).

The male shows signs of molt in the wings.

PLATYRINCHUS CORONATUS CORONATUS Sclater: ***Golden-crowned Flatbill***

Platyrhynchus coronatus SCLATER, Proc. Zool. Soc. London, vol. 26, 1858, p. 71 (Río Napo, Ecuador).

SPECIMENS COLLECTED

1 im. ♂, 1 im. ♀, Brazil, Rio Cauabury, above mouth of Rio Já, Amazonas, November 4, 1930.
1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 4, 1930.
1 im. ♂, 1 im. ♀, Brazil, Rio Maturacá, November 9–13, 1930.
2 ad. ♂, 2 im. ♂, Brazil, Salto do Huá, Rio Maturacá, Brazil-Venezuela border, November 14–23, 1930.
1 im. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Caño Atamoni, February 6, 1931.
1 im. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 12, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 18, 1931.

The adult male from Cerro Yapacana is slightly intermediate between typical *coronatus* and *gumia* of the Guianas and southeastern Venezuela (Mounts Roraima and Auyán-tepuí). It agrees with the former in coloration but has the small size (wing 53 mm.) of *gumia*. Zimmer (Amer. Mus. Nov., No. 1043, 1939, p. 9) records specimens from opposite El Merey, Río Casiquiare, southern Venezuela, as typical *P. c. coronatus*.

A specimen taken February 9, 1930, on the Rio Negro, was preserved in alcohol.

TOLMOMYIAS SULPHURESCENS CHERREI (Hartert and Goodson): ***Cherrie's Flatbill***

Rhynchocyclus sulphurescens cherrei HARTERT and GOODSON, Nov. Zool., vol. 24, 1917, p. 414 (Cayenne, French Guiana).

SPECIMENS COLLECTED

1 im. –, Brazil, Salto do Huá, Rio Maturacá, November 22, 1930.
1 im. ♂, Brazil, Serra Imeri, near Salto do Huá, December 4, 1930.
3 ad. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 17–21, 1931.

The two Brazilian examples (actually taken very close to the Brazilian-Venezuelan boundary) are slightly darker than the Cerro Yapacana birds, and may be intermediate between *cherrei* and *insignis*.

TOLMOMYIAS SULPHURESCENS INSIGNIS Zimmer: ***Zimmer's Flatbill***

Tolmomyias sulphurescens insignis Zimmer, Amer. Mus. Nov., No. 1045, 1939, p. 5 (Rosarinho, Rio Madeira (left bank), Brazil).

SPECIMEN COLLECTED

1 –, Brazil, near Muirapinima, Rio Negro, October 4, 1930.

Zimmer records (*cit. supra*, p. 18) six specimens of this species from Muirapinima, as *T. s. insignis*. The characters by which this race may be distinguished from *cherrei* are stated to be the "very much duller wing-markings, . . . the wing bars and the margins of the tertials greenish instead of yellowish, hardly brighter than the external margins of the primaries . . ." The present specimen, judged by these criteria, is not a very typical example of its race but is, as one might expect on geographic grounds, somewhat intermediate between it and *cherrei*, but nearer *insignis*.

TOLMOMYIAS POLIOCEPHALUS POLIOCEPHALUS (Taczanowski): ***Gray-crowned Flatbill***

Rhynchocyclus poliocephalus Taczanowski, Ornithologie de Pérou, vol. 2, 1884, p. 285 (Nauta, Peru).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 16, 1931.
1 ad. ♂, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.
1 im. ♀, Venezuela, San Antonio, Upper Orinoco, March 9, 1931.

The male was in breeding condition. It is slightly smaller and duller in color than the female.

Zimmer (Amer. Mus. Nov., No. 1045, 1939, p. 14) has found that the birds from the Upper Rio Negro, and the Casiquiare and Upper Orinoco are typical *poliocephalus* and not *sclateri* of Manáos and eastward. The present material bears this out.

TOLMOMYIAS POLIOCEPHALUS SCLATERI (Hellmayr): ***Sclater's Flatbill***

Rhynchocyclus poliocephalus sclateri Hellmayr, Verh. zool.-bot. Ges. Wien, vol. 53, 1903, p. 207 (Barra do Rio Negro = Manáos, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 3 im. ♂, 1 ad. ♀, Brazil, Manáos, September 30–October 1, 1930.

All five specimens are in somewhat abraded plumage. This race is generally duller in coloration and has a more whitish throat than the nominate form.

TOLMOMYIAS FLAVIVENTRIS COLLINGWOODI (Chubb): ***Northern Yellow-vented Flatbill***

Rhynchocyclus flaviventris collingwoodi Chubb, Bull. Brit. Orn. Club, vol. 40, 1920, p. 109 (Macqueripe Valley, Trinidad).

SPECIMENS COLLECTED

1 ad. ♂, 2 ad. ♀, 3 im. ♂, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 3–16, 1931.

5 ad. ♂, 3 ad. ♀, 3 im. ♂, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 8–15, 1931, and January 3–5, 1930.

1 ad. ♂, 1 ad. ♀, Venezuela, Ciudad Bolívar, June 8–10, 1931.

1 im. ♂, Venezuela, Soledad, December 10, 1929.

The differences between *collingwoodi* of Trinidad, Tobago, northern Venezuela, and up the Orinoco Valley to Puerto Ayacucho and the Caura Valley, and *aurulentus* of Santa Marta to the Lower Río Magdalena, Colombia, as pointed out by Zimmer (Amer. Mus. Nov., No. 1045, 1939, p. 16) hold in the material studied together with the present series, although they are rather slight. The present race averages darker, less clear yellow and green than *aurulentus*.

Another example from Puerto Ayacucho, January 3, 1930, was preserved in alcohol.

RAMPHOTRIGON RUFICAUDA (Spix): ***Rufous-tailed Flatbill***

Platyrhynchus ruficauda SPIX, Avium species novae . . . Brasiliam . . ., vol. 2, 1825, p. 9, pl. 11, fig. 1 ("in sylvia flum. Amazonum").

SPECIMENS COLLECTED

1 im. ♀, Brazil, Serra Imeri, Rio Maturacá, Brazil-Venezuela border, November 29, 1930.

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 6, 1930.

1 ad. ♂, 1 ad. ♀, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Upper Orinoco near Isla Temblador, February 25, 1931.

The Brazilian adult female has a slightly broader bill than any of the Venezuelan specimens.

In his notes on this species Zimmer (Amer. Mus. Nov., No. 930, 1937, p. 26) states that four specimens collected at Chamicuros, Peru, and now in the British Museum, are the only Peruvian examples recorded. It may be noted that there is a specimen from Pebas, Peru, collected by Orton, in the United States National Museum (No. 55325). The bird has no date on the label but was cataloged in the Museum in June 1869.

TODIROSTRUM PICTUM Salvin: ***Painted Tody Tyrant***

Todirostrum pictum SALVIN, Bull. Brit. Orn. Club, vol. 7, 1897, p. xv (Annai, British Guiana).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 16, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, December 31, 1930.

Before these two specimens were collected, the species appears to have been known only from the Guianas and from the Amazon around Obidos. They therefore constitute a notable westward extension of

known range and bring the species into close geographical contact with *T. guttatum*. On the basis of the great gap between the previous known records of the two, Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, p. 295) suggested that they might be conspecific. If the two are found to occur together on the Rio Negro as seems not unlikely, *guttatum* being recorded from Barcellos and *pictum* from Santa Isabel and São Gabriel, about 175 miles and 300 miles, respectively, to the west of Barcellos (*pictum* being the more eastern bird), it will be advisable to keep them as specific entities.

Hellmayr gives measurements of Guiana birds as follows: Wing (male) 41–42, (female) 39; tail 29–32; bill 13–15 mm. The present birds measure: Wing 39–40; tail 31–32; bill 14–15 mm. The immature bird is exactly like the adult except that it has a slight mixture of greenish gray on the black of the occiput.

TODIROSTRUM CINEREUM CINEREUM (Linnaeus): ***Gray-backed Tody Tyrant***

Todus cinereus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 178 (based on "The Grey and Yellow Flycatcher" Edwards, Gleanings of natural history, vol. 2, p. 110, pl. 262: Surinam).

SPECIMENS COLLECTED

1 im. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Puerto Ayacucho, Rio Orinoco, May 11–15, 1931.

2 ad. ♂, Venezuela, Ciudad Bolívar, June 10, 1931.

3 im. ♂, 1 ad. ♀, Venezuela, Soledad, Anzoátegui, June 11–12, 1931, and December 10, 1929.

The more southern birds (Puerto Ayacucho) have slightly larger bills than do the more northern examples, but the difference is not enough to be significant. Females have less dusky on the lower mandibles than the males but are otherwise similar to them. According to Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 488) typical *cinereum* occurs on Mount Auyán-tepuí as well as farther south to Rio Branco, Amazonas, Brazil. As far as I have been able to learn it has not been recorded as yet from northern Brazil west of the Rio Branco, that is, from the Rio Negro.

Two of the Soledad males were said to have had active gonads, in spite of their being labeled as immature.

An additional Puerto Ayacucho bird, taken January 6, 1930, was preserved in alcohol.

TODIROSTRUM MACULATUM ANNECTENS Zimmer: ***Rio Negro Tody Tyrant***

Todirostrum maculatum annectens Zimmer, Amer. Mus. Nov., No. 1066, 1940, p. 6 (Igarapé Cacao Pereira, lower right bank of Rio Negro, Brazil).

SPECIMENS COLLECTED

1 im. ♂, 1 im. ♀, Brazil, Santa Isabel, Rio Negro, October 13, 1930.

1 im. ♀, Brazil, Barcellos, Rio Negro, October 6, 1930.

These specimens are identified to subspecies chiefly by geographic considerations as the total comparative material seen is slight. They agree with Zimmer's description of this race, but it may be recalled that he called *annectens* and *diversum* nothing more than "recognizable intermediate forms" when he proposed them. On the basis of the slender series seen (3 *annectens*, 2 *diversum*, and 1 *signatum*) it is not possible to be unduly critical, but it is difficult to be deeply convinced that so many races are recognizable.

Apparently this species does not occur in the Upper Orinoco Valley; at least no records from there have been noted.

EUSCARTHMORNIS ZOSTEROPS ZOSTEROPS (Pelzeln): ***White-eyed Tody Tyrant***

Euscarthmus zosterops PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, p. 102, 173, part (Marabitanas, Rio Negro).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 8, 1930.

1 ad. ♂, 1 ad. –, 2 im. ♂, 2 im. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, April 3–28, 1931.

Zimmer (Amer. Mus. Nov., No. 1066, 1940, p. 13) has pointed out that *Idioptilon rothschildi* Berlepsch is the same as the present bird. A specimen from French Guiana (*Idioptilon rothschildi* was described from there) is certainly not seperable from any of the present series.

One of the immature males from Cerro Yapacana is unusually pale, more whitish, less yellowish on the abdomen.

EUSCARTHMORNIS IMPIGER (Sclater and Salvin): ***Active Tody Tyrant***

Euscarthmus impiger SCLATER and SALVIN, Proc. Zool. Soc. London, 1868, p. 171 pl. 13, fig. 1 (Caracas).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Soledad, Anzoátegui, December 11, 1929.

Soledad is rather far inland for this bird according to the records in literature. The species is largely a bird of the tropical coastal zone of northern Venezuela and of Caribbean Colombia.

LOPHOTRICCUS VITIOSUS AFFINIS Zimmer: ***Zimmer's Helmeted Tyrant***

Lophotriccus vitiosus affinis ZIMMER, Amer. Mus. Nov., No. 1066, 1940, p. 20 (Río Suno, above Avila, eastern Ecuador).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 16, 1930.

1 im. ♂, Brazil, Panela de Onca, Rio Cauabury, November 1, 1930.

1 ad. ♂, Brazil, Rio Maturacá, November 11, 1930.

1 im. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.

The adult is more whitish, less yellowish, below than the immature specimens.

In the absence of adequate comparative material, the present birds

are identified subspecifically by geographic considerations. They agree with Zimmer's description and comments.

COLOPTERYX GALEATUS (Boddaert): *Helmeted Pygmy Tyrant*

Motacilla galeata Boddaert, Table des planches enluminéez . . ., 1783, p. 24 (based on Daubenton, Planches enluminées . . ., pl. 391, fig. 1: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 3 im. ♀, Brazil, São Gabriel, Rio Negro, December 26, 1930–January 9, 1931.

1 ad. ♂, 2 im. ♀, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.

1 im. ♂, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 1, 1931.

1 ad. ♂, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.

1 im. ♂, Venezuela, Brazo Casiquiare, at mouth of Caño Atamoni, February 6, 1931.

1 im. ♀, 1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 5–19, 1931.

Some of the February and April birds were in breeding condition. On the whole, the immature birds average slightly more yellowish below.

Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, pp. 333–334) and more recently Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 489) state that this flycatcher occurs in southern Venezuela, as far south as the falls of Maipures, the Caura Valley, and Mount Auyán-tepuí, and also in the Guianas and northern Brazil, west to Manáos. The present series extends the southwestern limits of the range somewhat to take in the lower stretches of the Rio Negro, the Casiquiare, and the Upper Orinoco.

ATALOTRICCUS PILARIS GRISEICEPS (Hellmayr): *Gray-headed Pygmy Tyrant*

Colopteryx pilaris griseiceps Hellmayr, Rev. Franç. Orn., vol. 3, No. 22, 1911, p. 24 (Altagracia, Río Orinoco, Venezuela).

SPECIMENS COLLECTED

1 im. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 11, 1931.

1 im. ♂, 1 ad. ♀, Venezuela, Ciudad Bolívar, June 8–10, 1931.

In spite of the fact that the two males were marked "immature" by the collectors, all three specimens were noted as having enlarged, active gonads when shot.

Our specimens appear to come from the two extremes of the Venezuelan range of the race.

MYIORNIS ECAUDATUS MISERABILIS (Chubb): *Northern Short-tailed Pygmy Tyrant*

Perissotriccus ecaudatus miserabilis Chubb, Ann. Mag. Nat. Hist., ser. 9, vol. 4, 1919, p. 301 (Bonasika River, British Guiana).

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 17, 1931.

Zimmer's statement (Amer. Mus. Nov., No. 1066, 1940, pp. 21–22) that there "is just enough difference observable between birds from

Bolivia and Peru and those from British Guiana, Venezuela, and Trinidad to warrant the recognition of Chubb's *miserabilis*, described from British Guiana . . ." is borne out by material studied in the present connection. His inclusion of *Perissotriccus* in the generic concept of *Myiornis* is likewise accepted. There still seem to be too many slightly differentiated genera in current usage in the Tyrannidae.

The single specimen collected is in fresh plumage.

CAPSIEMPIS FLAVEOLA FLAVEOLA (Lichtenstein): ***Yellow Tyrant***

Muscicapa flaveola LICHTENSTEIN, Verzeichniss der Doubletten des Zoologischen Museums . . . zu Berlin . . ., 1823, p. 56 (Bahia).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Providencia, Rio Negro, October 7, 1930.
1 ad. ♂, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.

The Brazilian specimen obtained is in worn plumage. It agrees quite well with a topotypical example but has the crown and occiput darker and browner. The Venezuelan example is less abraded although by no means in fresh feathering, and is more greenish above.

EUSCARTHMUS MELORYPHUS MELORYPHUS Wied: ***Rufous-crowned Pygmy Tyrant***

Euscarthmus meloryphus WIED, Beiträge zur Naturgeschichte von Brasilien, vol. 3, 1831, p. 947 (boundary line of Minas Gerais and Bahia).

SPECIMEN COLLECTED

1 im. ♂, Venezuela, Soledad, Anzoátegui, December 7, 1929.

Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, pp. 358–359) notes that specimens from Venezuela and Colombia have the sides of the head slightly more tinged with fulvous and the tail feathers shorter than in more southern examples. Berlepsch's name *paulus*, based on a Bogotá bird, is available for these northern birds. However, as Hellmayr points out, these characters are not constant; this is borne out by the material examined in the present study.

SERPOPHAGA HYPOLEUCA VENEZUELANA Zimmer: ***Orinoco White-bellied Serpophaga***

Serpophaga hypoleuca venezuelana ZIMMER, Amer. Mus. Nov., No. 1095, 1940, p. 14 (Caicara, Río Orinoco, Venezuela).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Isla Orocopiche, Anzoátegui, December 1, 1929.

In the absence of comparative material it is impossible to form any critical opinion of this subspecies. The single specimen obtained by the expedition agrees closely with Zimmer's description of *venezuelana*, to which form it should belong on geographic grounds.

INEZIA SUBFLAVA CAUDATA (Salvin): ***Salvin's Inezia***

Capsiempis caudata SALVIN, Bull. Brit. Orn. Club, vol. 7, 1897, p. 16 (Ourumee, British Guiana).

SPECIMEN COLLECTED

1 im. –, Venezuela, Soledad, Anzoátegui, December 10, 1929.

The single specimen obtained was just completing the molt into adult dress and is distinctly paler above than those from farther southward.

INEZIA SUBFLAVA OBSCURA Zimmer: ***Zimmer's Inezia***

Inezia subflava obscura Zimmer, Proc. Biol. Soc. Washington, vol. 52, 1939, p. 168 (Esmeraldas, Mount Duida, Venezuela; altitude 325 feet).

SPECIMENS COLLECTED

1 ad. –, Venezuela, Chapazon, right bank Brazo Casiquiare, January 30, 1931.
1 ad. –, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare near Caño Perro de Agua, February 18, 1931.
3 ad. ♂, 2 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 1–5, 1931.
2 ad. ♂, Venezuela, right bank Upper Orinoco, opposite Corocoro Island, March 12–13, 1931.

This fine series agrees with the description, as it does in its geographic origin, with Zimmer's subspecies *obscura*. The form is darker and browner above than typical *subflava*, and differs from *caudata* of the Lower Orinoco by having the anterior under parts deeper yellow with heavier shading on the sides and flanks, but with no buffy tinge on the throat and breast, the white mental spot smaller and more definitely demarcated, and by having the outer tail feathers with only a narrow outer margin of white or yellowish (not reaching the shaft), the bill slightly longer, the tarsus shorter.

ELAENIA FLAVOGASTER FLAVOGASTER (Thunberg): ***Yellow-billed Elaenia***

Pipra flavogaster Thunberg, Mém. Acad. Sci. St. Pétersbourg, vol. 8, 1822, p. 286 (Brazil=Rio de Janeiro).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 3, 1930, and May 12–19, 1931.
1 ad. ♀, Venezuela, Ciudad Bolívar, June 10, 1931.

The June bird from Ciudad Bolívar is exceedingly abraded and has the yellowish color largely faded or bleached out. The January bird is in fresh plumage; the May examples are somewhat worn. The Ciudad Bolívar specimen is one of those troublesome skins that could be referred almost as readily to *E. spectabilis* as to *E. flavogaster*, but it is too small for the former (wing 72; tail 62 mm.).

ELAENIA PARVIROSTRIS Pelzeln: ***Small-billed Elaenia***

Elaenia parvirostris Pelzeln, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 107, 178 (Curytiba, Paraná).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 9–18, 1931.

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1 im. ♂, 1 ad. ♀, 1 im. –, Venezuela, Ciudad Bolívar, June 8–11, 1931.
1 ad. ♂, Venezuela, Soledad, Anzoátegui, June 12, 1931.

Zimmer (Amer. Mus. Nov., No. 1108, 1941, pp. 11–12) has pointed out that this species appears to breed in and about northern Argentina around the end of January and to spend the southern winter in the northern parts of South America, returning south in September and October. The dates of the present series fit in very nicely with the extensive data given in his account, and so, too, do the plumage conditions of the various specimens. None of the nine birds was found to have enlarged gonads, a further agreement with Zimmer's account.

ELAENIA CHIRIQUENSIS ALBIVERTEX Pelzeln: ***White-crowned Elaenia***

Elaenia albivertex PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 107, 177 (Ypanema, São Paulo, Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, January 10, 1931.
1 ad. ♂, Venezuela, Chapazon, right bank Brazo Casiquiare, January 31, 1931.

The pale tips of the upper wing coverts are whiter and more pronounced in the male than in the female.

This flycatcher has an exceedingly extensive range without local differentiation—from Paraguay, southern Brazil, and Bolivia to the Guianas and Venezuela, eastern Peru, and Colombia (except the southwestern part.)

ELAENIA RUFICEPS Pelzeln: ***Rufous-crested Elaenia***

Elainea ruficeps PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 108, 178 (Borba, Rio Madeira).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 14, 1931.
1 im. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 7, 1931.

It is only recently that this flycatcher was found to occur as far west as southern Venezuela. Thus, Hellmayr (Catalogue of the birds of the Americas, pt. 5, 1927, p. 424) records it from the three Guianas and from northern Brazil (at Borba on the Rio Madeira). Zimmer (Amer. Mus. Nov., No. 1108, 1941, p. 15) has added Yavanari in the Rio Negro to the Brazilian part of the range and lists examples from the Casiquiare and from Mount Duida in Venezuela. The present two seem to be the most northwesterly examples of the species to date. Both are in rather worn plumage.

ELAENIA CANICEPS CINEREA Pelzeln: ***Gray Elaenia***

Elainea cinerea PELZELN, Zur Ornithologie Brasiliens, pt. 2, 1868, pp. 108, 180 (Marabitanas, Rio Negro).

SPECIMEN COLLECTED

1 im. ♂, Brazil, Cucuhy, Rio Negro, February 8, 1930.

The single example taken is in fairly fresh plumage.

MYIOPAGIS GAIMARDII GUIANENSIS (Berlepsch): *Guianan White-crested Flycatcher*

Elaenia gaimardi guianensis BERLEPSCH, Ornis, vol. 14, 1907, p. 421 (Camacusa, British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 9, 1930.
1 ad. ♂, Brazil, Rio Negro, October 21, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, December 31, 1930.
1 ad. ♂, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 1, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.
1 im. ♂, Venezuela, Brazo Casiquiare, Caño Durutomoni, February 19, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.
1 ad. ♀, 1 ad. –, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 8–20, 1931.

Birds taken from October to early February had active gonads and are in abraded plumage. Those taken in February, March, and May have no notes as to gonadic condition, a sign suggesting that they had the gonads reduced in size; in plumage these examples are diverse as to the amount of wear evident. None are in fresh plumage.

The Puerto Ayacucho examples, the northernmost of the series, show no approach to *bogotensis* (Berlepsch).

In addition to the skins listed above, mention may be made of a specimen taken at Santa Isabel, October 16, 1930, preserved in alcohol.

MYIOPAGIS VIRIDICATA PALLENS Bangs: *Pale Elaenia*

Myiopagis placens pallens BANGS, Proc. New England Zool. Club, vol. 3, 1902, p. 85 (Santa Marta, Colombia).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Soledad, Anzoátegui, December 11, 1929.

Further material from the Orinoco Valley is needed to settle the taxonomic status of this species there. Zimmer (Amer. Mus. Nov., No. 1108, 1941, pp. 22–23) writes that five birds from Caicara and Quiribana de Caicara, in the Orinoco region, agree fairly well with Santa Martan skins but differ from them in having the margins of the greater and median upper wing coverts finely and sharply outlined with pale yellowish green and in having slightly smaller bills. In the bill character they agree better with the nominate form but have the yellow of the crest slightly more strongly tinged with chrome. "It is possible that they represent an unnamed form but may go with *pallens* for the present. A . . . bird from San Esteban, inland from Puerto Cabello, presumably belongs here also." The present specimen agrees with a bird from El Sombrero, Guárico, northern Vene-

zuela, and with others from Santander del Norte, Colombia, but has a slightly smaller bill and slightly paler yellow crest. It is in worn plumage and does not show any pale narrow margins on the upper wing coverts.

SUBLEGATUS GLABER ORINOCENSIS Zimmer: ***Orinoco Smooth Flycatcher***

Sublegatus glaber orinocensis ZIMMER, Amer. Mus. Nov., No. 1109, 1941, p. 5 (Altagracia, Río Orinoco, Venezuela).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Soledad, Anzoátegui, December 4, 1929.

The small size (wing 62 mm.) and paleness of this specimen agree with the characters of *orinocensis*, to which form it should belong geographically. The bird is in fairly fresh feathering.

The birds in the Rio Negro drainage basin are darker and larger and form the race *S. g. sordidus* Zimmer.

PHAEOMYIAS MURINA INCOMTA (Cabanis and Heine): ***Northern Mouse-colored Tyrannulet***

Elainea incomta CABANIS and HEINE, Museum Heineanum, vol. 2, 1859, p. 59 (Cartagena, Colombia).

SPECIMENS COLLECTED

3 ad. ♂, 2 ad. ♀, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 11–16, 1931.

1 ad. ♀, Venezuela, Soledad, Anzoátegui, December 4, 1929.

1 ad. ♂, Venezuela, Laguna Icacal, near Ciudad Bolívar, December 8, 1929.

1 ad. ♂, 1 ad. ♀, 1 im. —, Venezuela, Ciudad Bolívar, November 26, 1929, and June 10–11, 1931.

The immature birds are slightly paler above than the adults. All the present specimens are in fairly worn plumage.

No birds from the Rio Negro have been available for study but it may be pointed out that Zimmer (Amer. Mus. Nov., No. 1109, 1941, p. 10) lists birds from Rio Negro, Igarapé Cacao Pereira, as the Amazonian form *P. m. wagae* (Taczanowski).

CAMPTOSTOMA OBSOLETUM NAPAEUM (Ridgway): ***Ridgway's Tyrannulet***

Ornithion napaeum RIDGWAY, Proc. U. S. Nat. Mus., vol. 10, 1888, p. 520 (Diamantina, near Santarém, Rio Tapajóz).

SPECIMENS COLLECTED

2 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 8–13, 1931.

These specimens have been compared with topotypical examples and found to be very slightly darker above, but not significantly so.

CAMPTOSTOMA OBSOLETUM VENEZUELAE Zimmer: ***Zimmer's Tyrannulet***

Camptostoma obsoletum venezuelae ZIMMER, Amer. Mus. Nov., No. 1109, 1941, p. 12 (La Cascabel, Río San Feliz, Venezuela).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, Venezuela, San Antonio, Upper Orinoco, March 1–5, 1931.

These examples differ from the Rio Negro birds in being very slightly more olive, less greenish, as stated in the original description of this race. In the other characters said to be diagnostic of *venezuelae* they do not differ from the specimens of *napaeum* seen. The last word has not yet been said on the forms of this flycatcher in Venezuela. If these examples are typical *venezuelae*, as it seems they are, as others from there have been so identified by the describer, then a specimen from El Sombrero, Guarico, northern Venezuela, probably represents still another race, characterized by paler coloration, especially above, and slightly larger and heavier bill. This specimen, recorded as *napaeum* prior to the description of *venezuelae* (Wetmore, Proc. U. S. Nat. Mus., vol. 87, 1939, p. 234) agrees in coloration with *pusillum* of Caribbean Colombia but differs from that race in having a much heavier bill. Birds from Goajira Peninsula, Colombia, are *pusillum*. Phelps (Bol. Soc. Venez. Cienc. Nat., No. 56, 1943, p. 316) identifies a specimen from Machiques, Perijá, extreme northwestern Venezuela as *pusillum* as well. Lest it be thought that the El Sombrero bird is merely an intergrade between *pusillum* and *venezuelae* let it be remembered that it has a larger bill than either.

From the material seen, *C. o. venezuelae* is a doubtful form.

TYRANNISCUS GRACILIPES GRACILIPES Sclater and Salvin: ***Slender-footed Tyrannulet***

Tyranniscus gracilipes Sclater and Salvin, Proc. Zool. Soc. London, 1867, p. 981 (Pebás, Peru).

SPECIMENS COLLECTED

1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 11, 1930.
1 ad. ♂, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 1, 1931.

This is another of the many instances of races of birds that pass unchanged from the Amazonian into the Orinocoan fauna. Zimmer (Amer. Mus. Nov., No. 1109, 1941, p. 22) writes, on the basis of more extensive material, that "series from the upper Rio Negro, Brazil, Mount Duida, the Rio Casiquiare, and the upper Orinoco are in close agreement and obviously represent the same form . . ."

TYRANNULUS ELATUS (Latham): ***Yellow-crowned Tyrannulet***

Sylvia elata Latham, Index ornithologicus, vol. 2, 1790, p. 549 (based on Daubenton, Planches enluminées . . ., pl. 708, fig. 2: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Manáos, October 2, 1930.
2 ad. ♂, Brazil, Santa Isabel, Rio Negro, October 15–17, 1930.
3 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, January 1–14, 1931.
1 im. ♂, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 15, 1931.

Two of the January birds were in breeding condition when collected.

Zimmer (Amer. Mus. Nov., No. 1126, 1941, p. 2) found, with an enormous series, that no races of this tyrannulet could be recognized.

He comments that birds from the Rio Negro area, Brazil, show the darkest extreme of coloration but are not consistent in that character, and many specimens from that region can be matched by birds from localities far distant. The variable character of the color of the sides of the head below the eyes mentioned by him is illustrated in the present series. Two of the birds have this area yellowish or greenish, the rest grayish.

Recently Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, p. 262) has concluded that *benii* Carr of Bolivia and *panamensis* Thayer and Bangs of Panama are recognizable races. In case further study should bear this out, the present birds would be *T. e. elatus*.

LEPTOPOGON SUPERCILIARIS VENEZUELENSIS Hartert and Goodson: ***Venezuelan Leptopogon***

Leptopogon superciliaris venezuelensis HARTERT and GOODSON, Nov. Zool., vol. 24, 1917, p. 413 (Cumbre de Valencia, Valencia, above Puerto Cabello, Carabobo, Venezuela).

SPECIMEN COLLECTED

1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, Venezuelan border, December 7, 1930.

It is unfortunate that the lone example of this form secured is in immature plumage as the locality whence it comes is a new one. If the bird is *venezuelensis*, with which it is here tentatively placed, it extends the known range southwestward across southern Venezuela to the Rio Negro in Brazil; it was formerly recorded from Trinidad and northern Venezuela.

LEPTOPOGON AMAUROCEPHALUS ORINOCENSIS Zimmer and Phelps: ***Orinoco Leptopogon***

Leptopogon amaurocephalus orinocensis ZIMMER and PHELPS. Amer. Mus. Nov., No. 1312, 1946, p. 15 (Santa Rosalía, Lower Caura Valley, State of Bolívar, Venezuela; altitude 100 meters).

SPECIMENS COLLECTED

1 ad. ♂, 2 im. ♂, Venezuela, Cerro Yapacana, March 20–April 21, 1931.

These three specimens have been compared for me with the type series of *orinocensis* by Dr. John T. Zimmer, with the unexpected result that they agree with this form and not with *obscuritergum*. It appears from this that *orinocensis* must range from Cerro Yapacana downstream to the Lower Caura region.

PIPROMORPHA OLEAGINEA CHLORONOTA (D'Orbigny and Lafresnaye): ***Orinoco Pipromorpha***

Muscicapa chloronotus "Lesson," D'ORBIGNY and LAFRESNAYE, Synopsis avium, *in* Mag. Zool., 1837, cl. 2, p. 51 (Yuracares, Bolivia).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Brazil, Santa Isabel, Rio Negro, October 10, 1930.

2 ad. ♂, 1 im. ♂, Brazil, Serra Imeri, near Salto do Huá, November 28–December 4, 1930.
1 im. ♂, Brazil, São Gabriel, Rio Negro, January 3, 1931.
1 im. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.
3 ad. ♂, 1 im. ♂, 1 ad. ♀, 1 im. –, Venezuela, Cerro Yapacana, Upper Orinoco, March 19–April 23, 1931.

The adult males from Cerro Yapacana were in breeding condition when collected.

While Hellmayr (Catalogue of the birds of the Americas, vol. 5, 1927, p. 497) has not recognized this race it appears that Todd, Zimmer, and Gyldenstolpe are correct in considering it distinct. The present series is quite uniform in appearance, indicating variational stability.

Family HIRUNDINIDAE: Swallows

PROGNE CHALYBEA CHALYBEA (Gmelin): *White-bellied Martin*

Hirundo chalybea Gmelin, Systema naturae, vol. 1, pt. 2, 1789, p. 1026 (Cayenne).

SPECIMENS COLLECTED

1 ad. –, Brazil, São Gabriel, Rio Negro, Amazonas, January 12, 1931.
1 ad. ♂, Brazil, Cucuhy, Rio Negro, Amazonas, February 1, 1930.

In his account of this wide ranging form, Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 18, footnote) states that he had not seen any Mexican material but that birds from Guatemala and Costa Rica seemed not to be separable from those from the northern half or more of South America. Mexican examples have been examined in the present connection and were found to be the same as those from the rest of the range of the race, as correctly worked out many years ago by Ridgway (Birds of North and Middle America, pt. 3, 1904, p. 40).

STELGIDOPTERYX RUFICOLLIS AEQUALIS Bangs: *Caribbean Rough-winged Swallow*

Stelgidopteryx ruficollis aequalis Bangs, Proc. New England Zool. Club, vol. 2, 1901, p. 58 (Santa Marta, Colombia).

SPECIMENS COLLECTED

2 im. ♂, 3 im. ♀, Venezuela, Soledad, June 11–12, 1931.

The immature birds do not have the roughened edge on the outer web of the outer primary found in adults. The adult bird has the rump with the light area less prominent than in the majority of skins from northern Venezuela, but still distinct. The pale rump is definitely indicated in the immature birds.

ATTICORA MELANOLEUCA (Wied): *Black-collared Swallow*

Hirundo melanoleuca Wied, Reise nach Brasilien . . ., vol. 1, 1820, p. 345 (Rio Belmonte, Bahia, Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cachoeira Destacamento, Rio Cauabury, Amazonas, December 14, 1930.

1 im. ♂, 2 ad. ♀, 1 im. ♀, 1 im. –, Brazil, São Gabriel, Rio Negro, Amazonas, January 9–19, 1931.

1 ad. ♀, Venezuela, Puerto Ayacucho, January 6, 1930.

1 im. ♂, Venezuela, Isla Yagrumo, Río Negro, Amazonas, January 25, 1931.

1 ad. ♂, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 2, 1931.

Two of the immature birds have the entire upperparts dark dull brown with the bluish-black feathers of the adult plumage coming in on the lesser upper wing coverts, apparently the first area to be affected by the molt. Of the other two immature examples one is indistinguishable from the adults, its immaturity being the judgment of the collector from unrecorded evidence; the other is in an advanced state of postjuvenal molt.

This species was made the type and only member of the genus *Diplochelidon* by Ridgway (Proc. Biol. Soc. Washington, vol. 16, 1903, p. 106) but it seems preferable to "lump" this generic split with *Atticora* as has been done by most recent authors.

The colored figure of this species in Sharpe and Wyatt's monograph of the swallows (vol. 2, 1888, pl. 98) shows a greater development of the posteriorly projecting midventral extension of the dark breast band than do the present specimens.

At Raudal San Sebastián Holt collected one set of eggs (three eggs) of this swallow from a nest in a sand bank.

HIRUNDO RUSTICA ERYTHROGASTER Boddaert: ***Barn Swallow***

Hirundo erythrogaster BODDAERT, Table des planches enluminéez . . ., 1783, p. 45 (Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, Amazonas, October 10, 1930.

Although labeled as an adult this specimen is really a younger bird in process of acquiring mature plumage.

IRIDOPROCNE ALBIVENTER (Boddaert): ***White-winged Swallow***

Hirundo albiventer BODDAERT, Table des planches enluminéez, 1783, p. 32 (Cayenne).

SPECIMENS COLLECTED

3 ad. ♂, 1 im. –, Brazil, São Gabriel, Rio Negro, December 30, 1930–January 12, 1931.

1 im. ♀, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.

The immature female from the Brazo Casiquiare is gray above except for the rump and the broad white markings on the wings. One of the São Gabriel birds, taken January 3, is a young bird just from the nest, not yet quite grown, sex not indicated. It has a slight bluish tinge on the back. An adult male examined has blue and

green mixed on the head and back, while another is steel blue with only a tinge of green.

Family CORVIDAE: Crows and Jays

CYANOCORAX HEILPRINI Gentry: *Heilprin's Jay*

Cyanocorax heilprini Gentry, Proc. Acad. Nat. Sci. Philadelphia, 1885, p. 90 (Rio Negro).

SPECIMENS COLLECTED

1 im. ♂, Venezuela, Upper Orinoco, right bank, opposite Corocoro Island, March 16, 1931.

3 ad. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 19–April 29, 1931.

Heilprin's jay seems to be a rare bird in collections, and little has been published about it. It differs at a glance from its other congeners by having the frontal crest.

Of the three adult males, two are considerably abraded and are less purplish, more brownish above and below than the third example. One of the abraded males and the adult female show signs of molt, especially in the tail. The immature birds are essentially like the adults in coloration.

When he wrote his account of this jay Hellmayr (Catalogue of the birds of the Americas, pt. 7, 1934, p. 25) had seen only seven specimens, distributed among four museums. The present series is therefore a sizable addition to the available material of this form.

CYANOCORAX VIOLACEUS Du Bus: *Violaceous Jay*

Cyanocorax violaceus Du Bus, Bull. Acad. Roy. Sci., Lettr. et Beaux-Arts Belg., vol. 14, 1847, p. 103 (Peru).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, Amazonas, November 6, 1930.

1 ad. ♀, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 7, 1931.

2 ad. ♀, Venezuela, Playa de Candela, Brazo Casiquiare, February 8, 1931.

1 ad. ♀, Venezuela, Buenos Aires, Brazo Casiquiare, February 21, 1931.

The specimens from Venezuela are somewhat paler than the one from Brazil, especially on the abdomen and upper back, and all the present specimens are paler on these areas, than are birds from Rio Combirciato, Peru, from Napo, Ecuador, and from Barrigon, eastern Colombia. Chubb (The birds of British Guiana, vol. 2, 1921, 588–589) uses the name *hyacinthinus* for the British Guiana bird on the basis of its being paler in coloration than examples from eastern Peru, Ecuador, and Colombia. It would seem from this that the name *hyacinthinus* Cabanis might be revised for the birds from Guiana to Venezuela and adjacent parts of northern Brazil. On the other hand, Hellmayr (Catalogue of the birds of the Americas, pt. 7, 1934, p. 28, footnote) records that an old faded specimen from British Guiana is somewhat duller than skins from upper Amazonia, but that birds

from the Caura, Venezuela, do not appreciably differ from others from upper Amazonia. He had three specimens from the Rio Negro (Marabitanas, São Joaquim, and from below Lamalonga and Santa Isabel). He concludes that *hyacinthinus* could not be maintained as a race, to say nothing of its use as a species as in Chubb's book.

The status of *hyacinthinus* as a possible northeastern subspecies of *C. violaceus* must remain unsettled until some one with ampler material looks into it. The type locality of *hyacinthinus* is Canuku Mountains, British Guiana, the opposite end of the range of the species from Peru, the locus of typical *violaceus*.

Two of the Venezuelan birds show signs of molt in the primaries.

Family TROGLODYTIDAE: Wrens

HELEODYTES GRISEUS (Swainson): ***Guianan Cactus Wren***

Furnarius griseus SWAINSON, Animals in menageries, 1837, p. 325 (savannas of Guiana).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 21, 1931.

The present specimen is slightly paler above than another female from the Rio Parime, northern Brazil, and also differs from it in having a shorter bill (26.8 mm. in the Venezuelan bird as against 30 mm. in the Brazilian, the culmen being measured from the base). More material is needed to determine the limits of individual variation in this wren.

This is a bird of the savannas from northern Brazil north to Venezuela and British Guiana.

HELEODYTES MINOR MINOR Cabanis: ***Lesser Cactus Wren***

Heleodytes minor CABANIS, Museum Heineanum, vol. 1, 1851, p. 80 (Venezuela).

SPECIMEN COLLECTED

1 im. ♀, Venezuela, Soledad, Anzoátegui, December 7, 1929.

The bird is in fresh plumage.

This form occurs along the Lower Orinoco and the Caura Rivers north to eastern Venezuela (Sucre).

HELEODYTES NUCHALIS NUCHALIS (Cabanis): ***Orinocoan Banded Wren***

Campylorhynchus nuchalis CABANIS, Arch. für Naturg., vol. 13, 1847, p. 206 (Cumaná, Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Soledad, Anzoátegui, December 7, 1929, and June 11–12, 1931.

Wetmore (Proc. U. S. Nat. Mus., vol. 87, 1929, pp. 237–238) has revised the races of this wren, and it is in accordance with his findings

that these specimens have been identified. The nominate form has the ventral spotting less heavy than in the north Venezuelan form, *brevipennis*, and has the throat and chin unmarked and a slightly smaller bill. It occurs in the Orinoco Valley from Caicara to Ciudad Bolívar and the Cumaná region.

THRYOTHORUS LEUCOTIS HYPOLEUCUS (Berlepsch and Hartert): ***White-bellied Wren***

Thryophilus albipectus hypoleucus Berlepsch and Hartert, Bull. Brit. Orn. Club, vol. 12, 1901, p. 12 (Altagracia, Río Orinoco, Venezuela).

SPECIMENS COLLECTED

1 im. ♀, Venezuela, Ciudad Bolívar, November 27, 1929.
1 ad. ♂, Venezuela, Soledad, Anzoátegui, June 12, 1931.

The adult male was noted as having enlarged gonads.

The young female is noticeably darker and more rufescent above than the adult male.

This race occurs along the middle stretches of the Orinoco from the Apure River to Ciudad Bolívar.

THRYOTHORUS LEUCOTIS ALBIPECTUS Cabanis: ***White-breasted Wren***

Thryothorus albipectus Cabanis, *in* Schomburgk, Reisen in Britisch-Guiana . . .' pt. 3, 1848 (=1849), p. 673 (Cayenne, French Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, 1 im. ♀, 1 im. –, Brazil, Providencia, Rio Negro, Amazonas, October 7, 1930.

These four specimens, which by their identity of locality must be considered as of one form, bear out very well Hellmayr's contention (Catalogue of the birds of the Americas, pt. 7, 1934, p. 161) that *albipectus* is an exceedingly unstable form. The unsexed immature bird is noticeably darker above and on the flanks, thighs, and under tail coverts than any of the other specimens; the immature female is buffier on the throat and breast than are the others.

If Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, No. 3, 1941, p. 301) are correct in splitting *albipectus*, the present series would probably have to be called *taeniopterus* Ridgway (type locality, Diamantina, Santarém, Brazil). A female topotype of *taeniopterus* agrees closely with the dark immature specimen of the present series. No topotypical *albipectus* have been seen. Gyldenstolpe (Kungl. Svenska Vet.-Akad. Handl., vol. 22, No. 3, 1945, p. 270) finds that material from Lower Amazonia indicates that neither color nor size characters appear to be valid for the recognition of *taeniopterus*.

THRYOTHORUS LEUCOTIS BOGOTENSIS (Hellmayr): ***Villavicencio Wren***

Throphilus albipectus bogotensis Hellmayr, Verh. zool.-bot. Ges. Wien, vol. 51, 1901, pp. 770, 794: ("Bogota," Colombia).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, Playa de Candela, February 8, 1931.

1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.

1 ad. ♂, Venezuela, Brazo Casiquiare, February 13, 1931.

1 ad. ♂, 1 im. ♀, Venezuela, Brazo Casiquiare, near Caño Matipin, February 18, 1931.

1 ad. ♀, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.

1 ad. ♂, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

3 ad. ♂, Venezuela, Puerto Ayacucho, Río Orinoco, May 11–15, 1931.

1 ad. ♀, 1 im. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 3–5, 1930.

This fine series of *bogotensis* has been compared with specimens of *zuliensis*, *venezuelanus*, *albipectus*, *hypoleucus*, and *leucotis*. Birds from the Brazo Casiquiare average slightly darker above than do Orinoco examples, but the difference is very small and not entirely constant.

THRYOTHORUS CORAYA GRISEIPECTUS Sharpe: *Gray-breasted Wren*

Thryothorus griseipectus SHARPE, Catalogue of birds in the collection of the British Museum, vol. 6, 1881, p. 236, pl. 15, fig. 1 (Nauta, Ecuador).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Cauabury, Amazonas, November 3, 1930.

1 ad. ♂, 2 ad. ♀, Brazil, Rio Maturacá, Amazonas, November 6–11, 1930.

1 im. –, Brazil, Salto do Huá, Rio Maturacá, November 20, 1930.

3 ad. ♂, 2 im. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, December 27, 1930–January 9, 1931.

1 ad. ♀, Brazil, Rio Negro Islands below San Carlos, Amazonas, January 27, 1931.

2 ad. ♂, 2 ad. ♀, Brazil, Cucuhy, Rio Negro, Amazonas, February 3–8, 1930.

1 ad. ♀, Venezuela, Cerro Guanari, Brazo Casiquiare, February 4, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below Caño Caripo, February 22, 1931.

Hellmayr (Catalogue of the birds of the Americas, pt. 7, 1934, p. 193) gives the wing length of this form as 60–65 mm. in males, 58–60 mm. in females. This is greater than the measurements of the present series, which run from 54 to 62.5 mm. in the males, and from 54 to 58 mm. in females. All these specimens come from the general area from which Hellmayr notes the birds have smaller bills and are somewhat deeper chestnut above. Within the series there are no significant geographic variations. It may be noted, however, that all the adult females have the forehead, crown, occiput, and nape considerably paler, more rufescent, less blackish, than a fairly topotypical one from Río Pastaza, Ecuador. The same difference does not hold for males from the two regions, however.

Of the three birds labeled as immature, two are not readily distinguishable from adults. One, however, is much darker on the breast

and abdomen, both of which areas are like the color of the flanks and vent in adult birds. This specimen also has the sides of the head without whitish streaks, as in adults of the race *T. c. herberti* from south of the Amazon.

TROGLODYTES MUSCULUS CLARUS Berlepsch and Hartert: ***Pale-bellied House Wren***

Troglodytes musculus clarus Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 8 (Bartica Grove, British Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 13, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 15, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.

The specimen from Santa Isabel is more rufescent on the upper parts of the head and body than are the other two, possibly because of its being in fresher plumage. It is less rufescent and slightly paler than another October female from northen Venezuela (Ocumare de la Costa).

HENICORHINA LEUCOSTICTA LEUCOSTICTA (Cabanis): ***Black-capped Wood Wren***

Cyphorhinus leucostictus Cabanis Arch. für Naturg., vol. 13, No. 1, 1847, p. 206 (Guiana).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, below mouth of Rio Maturacá, Amazonas, November 7, 1930.
2 ad. ♂, 1 ad. –, Brazil, Serra Imeri, near Salto do Huá, November 26, 1930–December 6, 1930.
1 im. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 6, 1931.

The supposedly immature bird cannot be distinguished from adults in plumage except for a little greater mixture of brown in the black of the occiput.

The Rio Cauabury specimen shows signs of molt in the wings.

MICROCERCULUS BAMBLA CAURENSIS Berlepsch and Hartert: ***Venezuelan Banded Wren***

Microcerculus caurensis Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 5 (Nicare, Caura River, Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Maturacá, November 11, 1930.
1 ad. ♂, 1 im. ♀, Brazil, Serra Imeri, near Salto do Huá, December 4–7, 1930.
1 ad. ♂, Brazil, São Gabriel, Rio Negro, January 14, 1931.
1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 2, 1931.

Gilliard (Bull. Amer. Mus. Nat. Hist., vol. 77, 1941, p. 493) has recorded *caurensis* from the foot of Mount Duida, the nearest locality to the present ones from which the species has been recorded. His bird was compared directly with the type. I have used his birds as comparative material (together with borrowed specimens of the other races of the species) and find the present series to be *caurensis*, as might be expected geographically. The known range of *caurensis* is

thereby extended farther to the southeast in Venezuela and in the Upper Rio Negro area of Brazil. Only af ew years ago Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, 1941, p. 302) added the species (nominate form) to the avifaunal list of Brazil; Pinto (Catalogo Aves do Brazil, pt. 2, 1944, p. 350) added the race *albigularis;* now we may add *caurensis* as well.

The female from Cerro Yapacana was in breeding condition.

Family MIMIDAE: Mockingbirds and Thrashers

MIMUS GILVUS MELANOPTERUS Lawrence: ***Black-winged Mockingbird***

Mimus melanopterus Lawrence, Ann. Lyc. Nat. Hist. New York, vol. 5, No. 1, 1849, p. 35, pl. 2 (Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Soledad, December 10, 1929.
2 im. –, Venezuela, Puerto Ayacucho, Río Orinoco, May 21, 1931.

Though these specimens appear to fall into the concept expressed by the use of the name *melanopterus*, the race may be in need of further study. The lone adult is definitely less pure grayish, more brownish gray on the upper parts than are adults of comparable sex and season from El Sombrero, and Ocumare de la Costa, northern Venezuela. It differs from them also in having a somewhat smaller bill although its shows no other mensural differences. On the other hand, it is slightly less brownish above than adults from Aragua, northern Venezuela, which are also considered *melanopterus*.

The immature birds are badly abraded but show no evidence of postjuvenal molt.

DONACOBIUS ATRICAPILLUS ATRICAPILLUS (Linnaeus): ***Black-capped Mocking Thrush***

Turdus atricapillus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 295 (eastern Brazil).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♂, Brazil, Ceo de Arary, above Parintins, Amazonas, September 20, 1930.

These three specimens have been compared with a long series from most parts of the range of this form as well as with examples of the other two races of the species.

The immature specimen has the top of the head and nape dark brown instead of black as in the adults and also has white superciliaries.

Family TURDIDAE: Thrushes

TURDUS ALBICOLLIS PHAEOPYGUS Cabanis: ***Gray-rumped Thrush***

Turdus phaeopygus Cabanis, *in* Schomburgk, Reisen in Britisch-Guiana . . . , pt. 3, 1848 (=1849), p. 666 (British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 16, 1930.
1 ad. ♀, Brazil, Cachoeira Manajó, Rio Cauabury, October 30, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, Maturacá, Amazonas, November 11–12, 1930.
2 ad. ♂, 1 ad. ♀, Brazil, Salto do Huá, Rio Maturacá, Amazonas, November 16–22, 1930.
4 ad. ♂, Brazil, Serra Imeri, Rio Maturacá, Amazonas, November 26, 1930–December 5, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 9–12, 1931.
5 ad. ♂, 6 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 19–April 25, 1931.

In studying the present series the other races of the species were gone over as well. The arrangement given by Hellmayr (Catalogue of the birds of the Americas, pt. 7, 1934, pp. 366–373) was found to hold except for two items. The race *minusculus* Bangs was found to be not valid (thereby agreeing with the results arrived at by Todd, Proc. Biol. Soc. Washington, vol. 44, 1931, p. 49) and was "lumped" with the present race; and the range of *phaeopygoides* Seebohm was found to include the "District Federal" of northern Venezuela as well as the areas mentioned by Hellmayr. A number of birds from the Lower Orinoco (without more explicit localities) were likewise found to fit the characters of *phaeopygoides*. Todd's race *cayennensis* was upheld, but the material seen was scant; no material of *coloratus* or of *contemptus* Hellmayr was available.

TURDUS NUDIGENIS NUDIGENIS Lafresnaye: ***Bare-eyed Thrush***

Turdus nudigenis LAFRESNAYE, Rev. Zool., vol. 11, 1848, p. 4 (Caracas).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Puerto Ayacucho, January 6, 1930.
1 ad. ♂, Venezuela, Ciudad Bolívar, June 11, 1931.

The June specimen is in exceedingly worn plumage; the January bird is quite freshly feathered.

TURDUS FUMIGATUS FUMIGATUS Lichtenstein: ***Sabian Thrush***

Turdus fumigatus LICHTENSTEIN, Verzeichniss der Doubletten des Zoologischen Museums . . . zu Berlin . . ., 1823, p. 38 (Brazil; restricted to Rio Espirito Santo, Espirito Santo, by Hellmayr (Catalogue of the birds of the Americas, pt. 7, 1934, p. 385).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Brazo Casiquiare, February 7, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11–13, 1931.
1 ad. ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.
1 ad. ♂, Venezuela, San Antonio Upper Orinoco, March 8, 1931.

This series shows that the race is very variable in tone of color, an observation also made by Hellmayr (Catalogue of the birds of the

Americas, pt. 7, 1934, p. 386, footnote). Thus, the two males from the Brazo Casiquiare are different enough to suggest two races but for the fact that they both were taken in the same area at the same time. One is very much more rufescent and darker than the other. The two birds from the Upper Orinoco resemble the paler of the Brazo Casiquiare males. It is obvious from these few birds that great series are needed before we can determine whether or not the geographic variations exceed individual variability in this form. For the present, at least, it may be well to follow Hellmayr in considering *fredericki* Chubb and *abariensis* Chubb as synonyms of *fumigatus*.

TURDUS IGNOBILIS ARTHURI (Chubb): ***Arthur's Black-billed Thrush***

Planesticus arthuri CHUBB, Bull. Brit. Orn. Club, vol. 33, 1914, p. 131 (Abary River, British Guiana).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 11, 1931.

This lone specimen appears to belong to the present race, which I have otherwise seen from the lowlands of Duida and from Rio Negro, and constitutes a slight extension of the known range of the form westward, the previous westernmost point in Venezuela from which it had been reported being the base of Mount Duida. It also fits the colored illustration in Chubb's "Birds of British Guiana" (vol. 2, 1921, pl. 5, fig. 2) except that it does not have the throat nearly as white as in the plate. Its dimensions are as follows: wing 105; tail 78; culmen from the base 21 mm. It is a very worn plumage and is for this reason slightly paler than any of the other specimens seen.

TURDUS LEUCOMELAS ALBIVENTER Spix: ***Spix's Thrush***

Turdus albiventer SPIX, Avium species novae . . . Brasiliam . . ., vol. 1, 1824, 70, pl. 69, fig 2 (Pará, Brazil).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Laguna Icacal, Ciudad Bolívar, December 8, 1929.

1 ad. ♀, Venezuela, Ciudad Bolívar, June 10, 1931.

1 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 22–April 3, 1931.

1 ad. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, January 10, 1930, and May 9–12, 1931.

1 ad. ♂, 1 ad. ♀, Venezuela, Soledad, Anzoátegui, November 29, 1929, and June 13, 1931.

These specimens have been compared with three each from British Guiana, Venezuela, and Colombia, and with five from eastern Brazil (Bahia, Ceará, and Santarém). The differences shown by these 24 birds do not warrant keeping *epphipialis* Sclater distinct from *albiventer*, even when we bear in mind Hellmayr's statement (Catalogue of the birds of the Americas, pt. 7, 1934, p. 401) that the differences between the two, "while noticeable in series of freshly molted birds, are

hardly apparent, when worn examples of *T. l. albiventer* are compared." It is true that abraded *albiventer* are considerably less brownish olive, more grayish than birds in fresh feathering, but even in comparable specimens in fairly new plumage, the differences do not impress one as constant.

Birds collected from March to June are badly worn; those taken in November, December, and January are much less so.

HYLOCICHLA MINIMA ALICIAE (Baird): *Northern Gray-cheeked Thrush*

Turdus aliciae BAIRD, Pacific Railroad Survey, vol. 9, 1858, p. 217 (Illinois and Upper Missouri=West Northfield, Ill.)

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 15, 1931.

In identifying this bird as *aliciae* I am recognizing the Newfoundland birds as distinct from continental northern birds. The Newfoundland birds are the nominate form, a browner race.

HYLOCICHLA MINIMA MINIMA (Lafresnaye): *Newfoundland Gray-cheeked Thrush*

Turdus minimus LAFRESNAYE, Rev. Zool., vol. 11, 1848, p. 5 (Bogotá, Colombia).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 16, 1931.
1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 15, 1931.

These birds have wing lengths of 97 and 98 mm., respectively, and are therefore too large for the southern race *bicknelli* but fit within the variational limits of the nominate subspecies.

Family SYLVIIDAE: Old World Warblers, Gnatcatchers, etc.

POLIOPTILA PLUMBEA PLUMBICEPS Lawrence: *Lawrence's Gnatcatcher*

Polioptila plumbiceps LAWRENCE, Proc. Acad. Nat. Sci. Philadelphia, vol. 17, 1865, p. 37 (Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Venezuela, Soledad, Estado Anzoátegui, December 4, 1929.
1 im. ♂, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.
2 ad. ♂, 1 ad. ♀, 1 im. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 12, 1931.
2 im. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 10, 1931.
4 ad. ♂, 1 im. ♂, 4 ad. ♀, 1 ad. –, Venezuela, Puerto Ayacucho, Río Orinoco, May 11–14, 1931.
1 ad. ♀, Venezuela, Ciudad Bolívar, Bolívar, June 11, 1931.
1 ad. ♂, Venezuela, Soledad, Anzoátegui, June 12, 1931.

In birds from northern Venezuela (Ocumare de la Costa, La Trilla, Independencia, and near Maracay) Wetmore found the feathers behind the nostrils to be whitish (Proc. U. S. Nat. Mus., vol. 87, 1939, p. 242). This is not true of the present series.

There is considerable variation in darkness or lightness of the upperparts regardless of season or sex in birds from the same localities.

Family CYCLARHIDAE: Peppershrikes

CYCLARHIS GUJANENSIS FLAVIPECTUS Sclater: ***Yellow-breasted Peppershrike***

Cyclorhis flavipectus SCLATER, Proc. Zool. Soc. London, vol. 26, 1858, p. 448, part (Trinidad).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Soledad, Anzoátegui, December 10, 1929.

This form is found in northern Venezuela and Trinidad, west to the eastern slopes of the eastern Andes of Colombia. The present specimen resembles skins from more northern localities in Venezuela in the color of the upper surface, including the crown, but is slightly duller yellow below.

A specimen taken at Ciudad Bolívar, June 8, 1931, was preserved in alcohol.

CYCLARHIS GUJANENSIS GUJANENSIS (Gmelin): ***Guianan Peppershrike***

Tanagra gujanensis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 893 (French Guiana).

SPECIMENS COLLECTED

1 im. ♂, 1 im. ♀, Brazil, Manáos, October 1, 1930.

8 ad. ♂, 4 ad. ♀, Venezuela, Puerto Ayacucho, Rio Orínoco, January 2, 1930 (1 ♂) and May 11–19, 1931 (all the rest).

Most of the May adults were noted as having enlarged gonads when collected.

When compared with *C. g. flavipectus* these birds are distinctly darker green on the back, and darker gray on the crown, while below the yellow is definitely more greenish. They are identified as typical *gujanensis* in accordance with the recent treatment by Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 200). Two immature birds, fully grown, taken at Manáos, October 1, 1930, are still duller green on the breast. It seems not improbable that birds assigned to this race may require further division when material comes to hand.

Family VIREONIDAE: Vireos

VIREO VIRESCENS VIRESCENS Vieillot: ***Red-eyed Vireo***

Vireo virescens VIEILLOT, Histoire naturelle des oiseaux de l'Amérique septentrionale, Sept. 1, "1807," 1808, p. 84, pl. 53 (no locality given=New Jersey).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, 2 ad. ♀, 1 im. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, December 27, 1930–January 19, 1931.

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 7, 1930.

2 im. ♀, Venezuela, Chapazon, right bank Brazo Casiquiare, January 30–31, 1931.

1 ad. –, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 1, 1931.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 5, 1931.
2 ad. ♂, 1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 1–14, 1931.

The latest, in point of time of the year, of these wintering birds were taken at a time when the species ordinarily begins to arrive in southern United States.

An additional specimen, taken at São Gabriel, January 9, 1931, was preserved in alcohol.

VIREO VIRESCENS VIVIDIOR Hellmayr and Seilern: ***Caribbean Vireo***

Vireo chivi vividior Hellmayr and Seilern, Verh. Orn. Ges. Bayern, vol. 12, 1913, p. 315 (Caparo, Trinidad).

SPECIMENS COLLECTED

2 ad. ♂, 2 ad. ♀, 1 ad. –, Venezuela, Puerto Ayacucho, Río Orinoco, January 5, 1930, and May 8–13, 1931.
1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 17, 1931.
1 ad. ♂, Venezuela, Tamatama, Upper Orinoco, February 23, 1931.
1 ad. ♂, 1 ad. ♀, Venezuela, Bolívar, Estado Bolívar, June 8–10, 1931.

The May and June birds are in more worn plumage than are those taken from January to April.

VIREO VIRESCENS SOLIMOENSIS Todd: ***Amazonian Vireo***

Vireo caucae solimoensis Todd, Auk, vol. 48, 1931, p. 412 (São Paulo de Olivença, Rio Solimoës, Brazil).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Manáos (Flores Tramway), Estado do Amazonas, October 2, 1930.

This specimen agrees in its small size (wing 65, tail 45.4 mm.) with the characters of *solimoensis*, to which form it should belong on the basis of geography as well.

HYLOPHILUS MUSCICAPINUS MUSCICAPINUS Sclater and Salvin: ***Flycatcherlike Hylophilus***

Hylophilus muscicapinus Sclater and Salvin, Nomenclator avium neotropicalium, 1873, p. 156 (St. Louis d'Oyapock, French Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, December 31, 1930–January 3, 1931.

The immature bird shows signs of molting, especially in the tail. São Gabriel appears to be the southwesternmost locality from which this vireo has been recorded; previously it was not known in Brazil west of Obidos and Rio Jary, although it had been reported from as far west as Suapure, La Unión, and Nicare, on the Caura River, in Venezuela.

The adult male is slightly larger than a comparable specimen from Bartica Grove, British Guiana.

HYLOPHILUS BRUNNEICEPS BRUNNEICEPS Sclater: ***Brown-headed Hylophilus***

Hylophilus brunneiceps Sclater, Proc. Zool. Soc. London, 1866, p. 322 ("in Brasil merid., Ypanema"=Rio Vaupé, a tributary of the Upper Rio Negro).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Chapazon, right bank Brazo Casiquiare, January 30, 1931.
1 ad. ♀, 1 im. ♂, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 22–27, 1931.

The immature bird is like the adults in plumage.

No comparative material either of this form or of *H. b. inornatus* has been available for examination, but the specimens agree closely with Sclater's colored figure (Ibis, 1881, pl. 11, fig. 1) and with descriptions.

HYLOPHILUS OCHRACEICEPS FERRUGINEIFRONS Sclater: ***Rufous-fronted Hylophilus***

Hylophilus ferrugineifrons SCLATER, Proc. Zool. Soc. London, 1862, p. 110 (Bogotá, Colombia).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 1–7, 1930.
2 ad. ♂, 1 ad. ♀, 1 im. ♀, Brazil, Serra Imeri, Rio Maturacá, November 29–December 6, 1930.
2 ad. ♂, 1 im. ♂, Brazil, Rio Maturacá, November 9–12, 1930.
2 ad. ♂, 1 im. ♀, Brazil, Salto do Huá, Rio Maturacá, November 18–20, 1930.
1 ad. ♂, Brazil, Rio Cauabury, above mouth of Rio Já, November 5, 1930.
1 ad. ♂, Venezuela, Chapazon, right bank of Brazo Casiquiare, January 30, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 11, 1931.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, April 21, 1931.

Zimmer (Amer. Mus. Nov., No. 1160, 1942, p. 5) found in his series that the specimens from the Rio Negro, Brazil, showed the greatest "extreme of positive brown coloration on the back and of deep rufescence on the anterior part of the head . . . " The present series, differing from Zimmer's material in being a north-south instead of an east-west section of the range of the race, shows no greater development of these characters in Rio Negro birds than in others from southern Venezuela. In fact, the 16 birds collected by the expedition show remarkably little variation.

HYLOPHILUS SEMICINEREUS VIRIDICEPS (Todd): ***Green-headed Hylophilus***

Pachysylvia semicinerea viridiceps TODD, Proc. Biol. Soc. Washington, vol. 42' 1929, p. 191 (Pied Saut, French Guiana).

SPECIMEN COLLECTED

1 ad. ♀, Brazil, Santa Isabel, Rio Negro, October 17, 1930.

This specimen is in fairly fresh plumage; it is definitely referable to *viridiceps* and shows no variation in the direction of *juruanus* Gyldenstolpe.

This race occurs from French Guiana west to southern Venezuela (the Mount Duida region) south to the north bank of the Amazon.

HYLOPHILUS FLAVIPES ACUTICAUDA Lawrence: ***Buff-bellied Hylophilus***

Hylophilus acuticauda Lawrence, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 37 (Venezuela; Puerto La Cruz, Carabobo suggested as restricted type locality by Todd, Proc. Biol. Soc. Washington, vol. 42, 1929, p. 198).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Venezuela, Soledad, December 7, 1929.
4 ad. ♂, 2 ad. ♀, 1 im. ♀, Venezuela, Ciudad Bolívar, June 8–11, 1931.

All the June adults were noted as having enlarged, active gonads when collected. All of them are in worn plumage, decidedly light below, being more grayish green, less olive above then the December birds from Soledad, which are in fresher plumage.

This series has been compared with, and found to agree with, the series of *acuticauda* in the American Museum of Natural History by Dr. Wetmore, who has kindly given me this information.

Family COEREBIDAE: Honeycreepers

CHLOROPHANES SPIZA SPIZA (Linnaeus): ***Green Honeycreeper***

Motacilla spiza Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, 188 (based on "The Green Black-cap Flycatcher" Edwards, A natural history of birds, vol. 1, p. 25, pl. 25, left fig.: Surinam).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Rio Cauabury, Amazonas, October 21, 1930.
1 ad. ♂, Venezuela, Cerro Yapacana, Upper Orinoco, March 28, 1931.

The colors, especially the shades of blue-green, in these birds appear to change somewhat in the course of time in the old museum specimens, making it hard to test the validity of some of the races. Thus, three specimens from Bahia, Brazil, on the basis of geography must be *axillaris* Zimmer but are quite indistinguishable in color from typical *spiza*. The present male from Cerro Yapacana is the most bluish below of any of a fair series of this form, which makes me wonder if the blue may not diminish in time (which would account for the two *axillaris* also).

CYANERPES NITIDUS (Hartlaub): ***Short-billed Honeycreeper***

Cocreba nitida Hartlaub, Rev. Zool., vol. 10, 1847, p. 84 ("du nord du Perou").

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 1, and February 2, 1931.
1 ad. ♂, Venezuela, Solano, Brazo Casiquiare, February 2, 1931.

The present series adds nothing to what Zimmer (Amer. Mus. Nov., No. 1203, 1942, p. 14) has written on the basis of an astonishingly large series of what has been considered hitherto a rare bird in collections.

CYANERPES CYANEUS DISPAR Zimmer: ***Zimmer's Blue Honeycreeper***

Cyanerpes cyaneus dispar Zimmer, Amer. Mus. Nov., No. 1203, 1942, p. 10 (Buena Vista, Río Casiquiare, southwestern Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Serra Imeri, near Salto do Huá, Brazilian-Venezuelan border, December 5, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 17, 1931.

1 ad. ♂, Brazil, Cucuhy, Rio Negro, Amazonas, February 4, 1930.

6 ad. ♂, 1 im. ♂, 1 ad. ♀, 1 im. unsexed, Venezuela, Cerro Yapacana, Upper Orinoco, April 5–17, 1931.

Two of the Venezuelan males have a slight greenish edging to the outer web of the outermost primaries of the left wing, but not of the right one. The male from Serra Imeri is considerably larger in all its dimensions than any of the others.

Prior to the description of *dispar*, in his discussion of *C. c. cyaneus*, Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 254) noted that Brazilian specimens from south of the Amazon generally have shorter and slenderer bills than do more northern examples and suggested that if they were to be separated Cabanis's name *Arbelorhina brevipes* was available for them. Although it was described as from "Porto Cabello," Venezuela, Hellmayr claimed that the type is really a Brazilian trade skin. The material I have seen from Brazil south of the Amazon (but not *violacens* Zimmer) averages longer in its bill measurements than does the present more northern series. The material at hand would tend to suggest that "Porto Cabello" may well have been the correct locality after all for *brevipes*. There seems, from all this divergence of views, to be more individual variation than can be reconciled to the recognition of *brevipes* as distinct, no matter which view of its type locus be accepted. Zimmer (Amer. Mus. Nov., No. 1203, 1942, p. 8) has also found "too much overlap to permit the recognition of '*brevipes*' . . ."

As stated in the original description of *dispar*, which is definitely an intermediate race without strikingly distinctive characters, "males from the Cassiquiare region of southwestern Venezuela agree with those of *violacens* in coloration and length of bill but have the wing as long as that of Guianan *cyaneus*. The females, furthermore, have a slight distinction in color from the Matto Grosso females. Since there is a fairly extensive area occupied by birds of this sort, it seems advisable to give the population a distinctive name."

CYANERPES CAERULEUS MICRORHYNCHUS (Berlepsch): *Small-billed Honeycreeper*

Coereba caerulea microrhyncha BERLEPSCH, Journ. für Orn., vol. 32, 1884, p. 287 (Bucaramanga, Colombia).

SPECIMENS COLLECTED

5 ad. ♂, 2 ad. ♀, Brazil, Serra Imeri, Rio Maturacá, November 28–December 4, 1930.

1 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 1, 1931.

2 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 2–9, 1931.

7 ad., ♂, 1 im. ♂, 6 ad. ♀, 1 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 5–29, 1931.

The immature male from Cerro Yapacana is in a very advanced stage of the postjuvenal molt, the only remnants of its youthful plumage being a few scattered greenish feathers on the back. The immature female is similar to the adults but lacks the light bluish malar line.

I follow Zimmer (Amer. Mus. Nov., No. 1203, 1943, p. 12) in considering *cherriei* a synonym of *microrhynchus*. The measurements given for *cherriei* (to which race the present series would have to be referred if it were valid) by Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 261) are slightly smaller than those I get for the Serra Imeri birds. He gives wing lengths of from 52–54 mm. and bill lengths of 15–16, rarely 17 mm., for males, while I find the males to have wing measurements of from 52–57 mm., and bills of from 16.5–18 mm.

DACNIS CAYANA CAYANA (Linnaeus): ***Cayenne Dacnis***

Motacilla cayana Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 366 (based on "*Sylvia cayenensis coerulea*" Brisson, Ornithologie, vol. 3, p. 534, pl. 28, fig. 1: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Brazil, Manáos (Flores Tramway) Amazonas, September 29–30, 1930.

1 im. ♂, Brazil, Barcellos, Rio Negro, Amazonas, October 6, 1930.

1 ad. ♂, Brazil, Rio Maturacá, Amazonas, November 11, 1930.

1 ad. ♂, 2 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 5–16, 1931.

1 im. ♂, Venezuela, Raudal San Sebastián, Brazo Casiquiare, February 1, 1931.

1 ad. ♀, Venezuela, Solano, Brazo Casiquiare, February 2, 1931.

3 ad. ♂, 2 im. ♂, 4 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 1–23, 1931.

3 ad. ♂, 2 ad., ♀, Venezuela, Puerto Ayacucho, Upper Orinoco, January 5, 1930, and May 11–20, 1931.

Although Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 269) writes that "birds from Amazonia and Venezuela are apparently inseparable from a Guianan series, the throat being deep black in the male . . ." it happens that the throats of all the males in the present series are tinged with green, differing in this respect from birds from British Guiana and Trinidad, but are equally dark.

Two males in an advanced stage of the postjuvenal molt (Puerto Ayacucho, May 20, and São Gabriel, January 15) indicate that the order of this molt is not definite, one has the adult feathering completely on the upperparts, except for the wings, while the other still has many green feathers left above, but the latter specimen is just as far along with the molt on the underparts as is the former.

DACNIS FLAVIVENTER D'Orbigny and Lafresnaye: ***Yellow-bellied Dacnis***

Dacnis flaviventer D'Orbigny and Lafresnaye, Mag. Zool., vol. 7, cl. 2, 1837, p. 21 (Yuracares, Bolivia).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 17, 1931.

The single example collected is in fresh plumage, it has the black frontal band slightly more extensive than in others seen from Colombia and Ecuador. However, the total material seen is small, while Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 280, footnote) and Zimmer (Amer. Mus. Nov., No. 1193, 1942, p. 2) both concluded after examining extensive series that the species showed no geographic variational tendencies.

COEREBA FLAVEOLA BOLIVARI Zimmer and Phelps: ***Bolívar Bananaquit***

Coereba flaveola bolivari ZIMMER and PHELPS, Amer. Mus. Nov., No. 1312, 1946, p. 20 (Ciudad Bolívar).

SPECIMENS COLLECTED

2 ad. ♂, 1 im. ♂, 1 im. ♀, Venezuela, Ciudad Bolívar, June 8–9, 1931.

The specimens listed above are topotypical *bolivari*, a form stated to be similar to *C. f. luteola*, but with the back paler, brownish gray rather than dark brownish black, and with the crown less deeply black. In their more grayish dorsal color the birds approach *guianensis* but have the distinct white spot on the primaries as in *luteola*.

COEREBA FLAVEOLA RORAIMAE Chapman: ***Roraima Bananaquit***

Coereba guianensis roraimae CHAPMAN, Amer. Mus. Nov., No. 341, 1929, p. 6 (Arabupu, Roraima, Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, 2 im. ♂, Venezuela, San Antonio, Upper Orinoco, March 3–8, 1931.

2 ad. ♂, 2 ad. ♀, Venezuela, Upper Orinoco, right bank opposite Corocoro Island, March 13–15, 1931.

9 ad. ♂, 1 im. ♂, 1 ad. ♀, 3 im. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 22–April 17, 1931.

There is no white alar speculum in the great majority of these specimens and only a trace of it in a few. It is this character that serves to separate this form from *C. f. colombiana*.

The races of this species and their ranges in southwestern Venezuela are exceedingly complicated, and enormous series are needed to work them out. Zimmer's arrangement (Amer. Mus. Nov., No. 1193, 1942, pp. 4–10) based on something over 800 specimens, which is followed here, indicates that no fewer than six races occur in southwestern Venezuela alone.

COEREBA FLAVEOLA COLOMBIANA (Cabanis): ***Colombian Bananaquit***

Certhiola colombiana CABANIS, Journ. für Orn., 1865, p. 412 ("Bogota," Colombia).

SPECIMENS COLLECTED

5 ad. ♂, 1 im. ♂, 5 ad. ♀, Venezuela, Puerto Ayacucho, January 4–8, 1930, and May 9–20, 1931.

These birds have a slightly developed white alar speculum. Their

identification as *colombiana* is corroborated by the fact that Zimmer (Amer. Mus. Nov., No. 1193, 1942, p. 10) records a series from Ayacucho as of this subspecies. This form is grayer dorsally and somewhat duller yellow on the breast and rump than *C. f. luteola.*

COEREBA FLAVEOLA MINIMA (Bonaparte): ***Cayenne Bananaquit***

Certhiola minima Bonaparte, Compt. Rend. Acad. Sci. Paris, vol. 38, 1854, p. 259 (Cayenne).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, Brazil, Manáos, Amazonas, September 27–October 2, 1930.
1 ad. ♂, Brazil, Rio Maturacá, Amazonas, November 11, 1930.
1 ad. ♂, Brazil, Salto do Huá, Rio Maturaca, November 21, 1930.
1 im. ♀, Brazil, Serra Imeri, Amazonas, November 29, 1930.
1 im. ♂, Venezuela, Chapazon, Brazo Casiquiare, January 30, 1931.

Compared with *C. f. roraimae*, the present birds are less blackish above, with the yellow of the rump and under surface duller. The white wing speculum is absent. The Chapazon specimen differs from immature *roraimae* in the same way as do the adults of the two races.

Zimmer (Amer. Mus. Nov., No. 1193, 1942, pp. 9–10) lists *C. f. minima* from Buena Vista and Solano, on the Casiquiare, and *C. f. intermedia* from the Casiquiare at the junction of the Río Huaynia. Chapazon, Buena Vista, and Solano are all within 25 miles of the junction of the Casiquiare and the Huaynia, so it would appear that Zimmer's *intermedia* may turn out to be specimens of *minima*. Yet he had 22 specimens of *intermedia* and 21 of *minima* from the Casiquiare.

ATELEODACNIS MARGARITAE Holt: ***Margaret's Ateleodacnis***

Ateleodacnis margaritae Holt, Auk, vol. 48, 1931, p. 570 (north bank of Rio Amazonas at Ceo do Arary above Parintins, Estado do Amazonas, Brazil).

SPECIMENS COLLECTED

1 ad. ♂, 1 unsexed (apparently subadult ♂), Ceo do Arary above Parintins, north bank of Amazon, Brazil, September 20, 1930.

The adult male is the type of the species. As stated in the original description this honeycreeper is closely related to *A. bicolor* (Vieillot) but has lighter, clear, blue-gray upperparts and pale bluish gray (not brownish buff) underparts. It is strange indeed to find this form close to the center of the range of its nearest congeneric relative.

The range of this form extends to Igarapé, Auará, just above Borba on the right bank of the Rio Madeira, and to northeastern Peru, according to Hellmayr (Catalogue of the birds of the Americas, pt. 8, 1935, p. 321).

Family COMPSOTHLYPIDAE: Wood Warblers

DENDROICA PETECHIA AESTIVA (Gmelin): ***Eastern Yellow Warbler***

Motacilla aestiva GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 996 (Canada).

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Soledad, December 10, 1929.

The single specimen collected closely matches others from the eastern United States in coloration and size.

DENDROICA STRIATA (Forster): ***Blackpoll Warbler***

Muscicapa striata FORSTER, Philos. Trans., vol. 62, 1772, p. 428 (Fort Severn, west coast of Hudson Bay).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Raudal Corocoro, Brazo Casiquiare, February 9, 1931.
1 ad. ♂, Venezuela, Brazo Casiquiare, near Caño Mabinagui, February 20, 1931.
1 im. ♂, Venezuela, San Antonio, Upper Orinoco, March 4, 1931.
1 ad. ♂, 2 im. ♂, 1 unsexed adult (= ♂), 3 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, April 10–20, 1931.

The two February males are in winter plumage, the April males are largely in breeding plumage. In his account of the molts of this warbler Dwight (Ann. New York Acad. Sci., vol. 13, 1900, pp. 264–266) says that "the early beginning of the prenuptial moult is indicated by a specimen labeled Roraima, British Guiana, November 1st, which shows active moult in progress on the nape, back, abdomen, and sides, where black and white feathers are replacing yellowish ones." This is certainly not borne out by the present series. However, the Raudal Corocoro male may be wrongly sexed as it is very greenish above and yellowish below, even more so than in any of the Cerro Yapacana females.

SEIURUS NOVEBORACENSIS NOVEBORACENSIS (Gmelin): ***Northern Waterthrush***

Motacilla noveboracensis GMELIN, Systema naturae, vol. 1, pt. 2, 1789, p. 958 (New York).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Puerto Ayacucho, Amazonas, January 5, 1930.

This specimen is of the typical race; its measurements are: wing 77, tail 52, culmen from the base 14.5; tarsus 21.5 mm., and its dorsal coloration is decidedly olivaceous.

SETOPHAGA RUTICILLA RUTICILLA (Linnaeus): ***Southern Redstart***

Motacilla Ruticilla LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 186 (Virginia).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Serra Imeri, near Salto do Huá, December 7, 1930.
1 ad. ♂, Venezuela, San Antonio, Upper Orinoco, March 3, 1931.
1 ad. ♂, 1 im. ♂, 4 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 20–April 11, 1931.

All these specimens are in rather worn plumage; the December bird is the least abraded. This is in keeping with the fact that the spring molt is late in this species, growing feathers being recorded on May specimens from New York by Dwight (Ann. New York Acad. Sci., vol. 13, 1900, p. 288).

SETOPHAGA RUTICILLA TRICOLORA (P. L. S. Müller): *Northern Redstart*

Motacilla tricolora P. L. S. Müller, Natursystem, Suppl., 1776, p. 175 (based on Buffon, Planches enluminées . . ., pl. 391, fig. 2: Cayenne).

SPECIMENS COLLECTED

4 ad. ♂, 2 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 25–April 11, 1931.

The small, relatively short bill, the small wing speculum of the males, and the lack of contrasting grayness on the crown and olive on the mantle in the females, place these specimens in this subspecies, only recently recognized as valid. Most of the arguments against the the validity of *tricolora* are due to a misconception of its range. It has been thought of as a northwestern breeding form, nesting in Montana, Idaho, and Washington, but it is really a northern race, extending eastward across Canada to Newfoundland. This, of course, accounts for the numerous eastern migrant specimens of *tricolora* mixed in with typical *ruticilla* from the eastern United States.

The specimens are largely in worn plumage, although one of the males, taken March 26, has new brown-edged feathers on the upper back.

GRANATELLUS PELZELNI PELZELNI Sclater: *Pelzeln's Red-breasted Chat*

Granatellus pelzelni Sclater, Proc. Zool. Soc. London, 1864, p. 606, pl. 27, upper fig. (Destacamento do Ribeirão, Rio Madeira, Brazil).

SPECIMEN COLLECTED

1 ad. ♂, Brazil, Santa Isabel, Rio Negro, Amazonas, October 17, 1930.

I have compared this specimen with 14 others of like sex from the Tapajóz and Madeira Rivers, Brazil, and from localities on the Caura and Mato Rivers, and El Callao, Venezuela. There is considerable variation in the extent of the black on the top of the head, some almost agreeing with the description of *G. p. paraensis* Rothschild (but differing from that race and agreeing with *pelzelni* in having a large white postocular mark, and in having white on the sides and lower abdomen). On the whole it appears that the more western birds (Upper Caura River, Venezuela, and Santa Isabel, Brazil) have less black on their crowns than do more eastern examples (Tapajóz River, Brazil, and El Callao, Venezuela). Specimens from near the type locality, on the Madeira River, are nearer to the northwestern birds in this respect. However, an example from the Suapure area, Venezuela, which should have less extensive black has the whole crown and

occiput black as in eastern birds. There may be a tendency, not yet carried to constancy, for a geographic difference. It would take more extensive material than I have seen to persuade me to attempt to divide "typical" *pelzelni* into two races. Furthermore, it may be noted that Hellmayr (Nov. Zool., vol. 13, 1906, p. 355) writes that specimens from the Caura River, Venezuela, agree with the type from the Upper Rio Madeira, which he considers the same as more eastern birds (except, of course, for the birds from the Pará district). If there were to be considered more urgently the possibility of a western split from *pelzelni*, the facts, as understood at present, would imply a range for which it would be difficult to conjure up ecological reasons.

Family ICTERIDAE: Blackbirds, Hangnests, etc.

GYMNOSTINOPS YURACARES YURACARES (Lafresnaye and d'Orbigny): ***Olive Oropendola***

Cassicus yuracares Lafresnaye and d'Orbigny, Synopsis avium, pt. 2, *in* Mag. Zool., vol. 8, 1838, cl. 2, p. 2 (Yuracares, Bolivia).

SPECIMENS COLLECTED

1 ad. unsexed, Brazo Casiquiare, near Caño Perro de Agua, Venezuela, February 18, 1931.
1 ad. ♂, Buenos Aires, Brazo Casiquiare, Venezeula, February 21, 1931.
1 ad. ♂, San Antonio, Upper Orinoco, Venezuela, March 3, 1931.
1 ad. ♀, San Antonio, Upper Orinoco, Venezuela, March 9, 1931.

These birds agree with two specimens from Peru and Colombia. The present specimens would be referable to *G. y. caurensis* Todd if that race were valid. However, the series bears out Hellmayr (Catalogue of the birds of the Americas, pt. 10, 1937, p. 9), who considers *caurensis* a synonym of *yuracares* although stating that "Venezuelan birds *may* have on average slightly weaker bills." The only difference I can see is that the remiges are darker, more chaetura-black in the Venezuelan and Colombian birds, paler, more clove brown in the Peruvian example. No topotypical Bolivian birds have been seen.

The birds listed above are in slightly worn plumage.

OSTINOPS VIRIDIS (P. L. S. Muller): ***Green Oropendola***

Oriolus viridis P. L. S. Müller, Natursystem, Suppl., 1776, p. 87 (based on "Cassique vert, de Cayenne" Daubenton, Planches enluminées . . ., pl. 328: Cayenne).

SPECIMENS COLLECTED

1 ♂, 3 ♀ ad., São Gabriel, Rio Negro, Amazonas, Brazil, January 12–19, 1931.
1 ♀ ad., 2 ♀ im., Cerro Yapacana, Upper Orinoco, Venezuela, April 27, 1931.

The male, although labeled as an adult, is probably an immature bird as it has a very small bill (culmen from base 59 mm. as against 71 mm. in an adult male from British Guiana) and has the throat, breast, and upper abdomen duller, more grayish, less yellowish green than in an adult from British Guiana, and has the thighs olive-green

only slightly mottled with chestnut. Although it has such a small bill, it is considered larger in its other dimensions than the Guianan male (wing 235 as against 222, tail 162 as against 158 mm.). There is no size difference between the present females and one from British Guiana, except in the bill, which varies from 52–53 mm. in the Venezuelan-Brazilian birds as against 55 mm. in the Guianan example.

The extent of the dusky olive on the lateral rectrix is very variable; in some specimens the entire outer web and the inner part of the tip of the inner web are of this color, while in others it may be reduced to a small terminal fleck on the outer web. This range of variation is apparently independent of age or geography.

The two immature females are paler than the adults both in the green and in the chestnut-colored parts.

In the absence of birds from eastern Peru, the arrangement arrived at by Hellmayr (Catalogue of the birds of the Americas, pt. 10, 1937, p. 16) is followed and *flavescens* is considered inseparable. This accounts for the binomial heading used here.

CACICUS CELA CELA (Linnaeus): ***Yellow-rumped Cacique***

Parus cela LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 191 ("in Indiis," errore; Surinam substituted by Hellmayr, Nov. Zool., vol. 13, 1906, p. 20).

SPECIMENS COLLECTED

1 ♂ ad., Santa Isabel, Rio Negro, Amazonas, Brazil, October 13, 1930.

1 ♂ ad., 2 ♀ ad., São Gabriel, Rio Negro, Amazonas, Brazil, December 30, 1930–January 6, 1931.

2 ♂ ad., Puerto Ayacucho, Venezuela, January 5–6, 1930.

1 ♂ ad., Raudal San Sebastián, Brazo Casiquiare, Venezuela, February 2, 1931.

1 im. ♂, San Antonio, Upper Orinoco, Venezuela, March 9, 1931.

1 ♂ ad., Cerro Yapacana, Upper Orinoco, Venezuela, April 29, 1931.

1 ♂ ad., 1 ♀ ad., Puerto Ayacucho, Río Orinoco, Venezuela, May 21, 1931.

These 11 specimens have been compared with a long series from many parts of the range of the race and no peculiarities were noted. The amount of plumbeous coloring on the basal part of the bill varies greatly; some specimens have none while others have both the maxilla and the mandible extensively tinged with it.

At Raudal San Sebastián these birds were nesting. Holt collected two sets of two eggs each there on February 2, 1931.

A specimen, not listed above, was collected at São Gabriel, January 10, 1931, and was preserved in alcohol.

PSOMOCOLAX ORYZIVORUS ORYZIVORUS (Gmelin): ***Rice Grackle***

Oriolus oryzivorus GMELIN, Systema naturae, vol. 1, pt. 1, 1788, p. 386 (based on "Rice Oriole" Latham, A general synopsis of birds, vol. 1, pt. 2, p. 423: Cayenne).

SPECIMEN COLLECTED

1 ad. ♂, Isla Temblador, Upper Orinoco, Venezuela, February 25, 1931.

The single specimen of the rice grackle obtained by the expedition is in somewhat abraded plumage and is the smallest adult of its sex seen (out of a comparative series of a dozen skins). Its dimensions are as follows: Wing 180, tail 137, culmen from base 32.5 mm. The bill is particularly small, the measurements of the culmen in the other males seen ranging from 34–39.5 mm.

MOLOTHRUS BONARIENSIS VENEZUELENSIS Stone: ***Venezuelan Shiny Cowbird***

Molothrus venezuelensis Stone, Auk, vol. 8, 1891, p. 347 (Venezuela=San Esteban, Carabobo).

SPECIMEN COLLECTED

1 "ad." ♂, Ciudad Bolívar, Venezuela, June 8, 1931.

The single specimen obtained was said by the collector to have had the gonads enlarged. It is, however, a young male in postjuvenal molt, the head, neck, breast, and upper back being covered with purplish adult feathers, while the rest of the bird still has the old, juvenal, dark-brown plumage, with merely a trace, here and there, above and below, of new bluish adult body feathers. The color of the juvenal feathers is very dark, much darker and without any of the olivaceous color seen in a juvenal male from Turmero, Aragua, Venezuela. This suggests that in this race, as in the nominate form, a considerable degree of dichromatism exists in the young (and possibly in the female adults).

HOLOQUISCALUS LUGUBRIS LUGUBRIS (Swainson): ***Swainson's Grackle***

Quiscalus lugubris Swainson, Animals in menageries, 1837, p. 299 ("Brazil," errore=British Guiana according to Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 32).

SPECIMENS COLLECTED

1 ad. ♂, 2 im. ♂, 1 ad. ♀, Ciudad Bolívar, Venezuela, December 12, 1929, and June 8–9, 1931.

The immature males resemble the adult female, but are paler, more grayish below, and slightly paler, more brownish above on the head and upper back. They are both in molt in the wings and tail.

ICTERUS CHRYSOCEPHALUS (Linnaeus): ***Moriche Oriole***

Oriolus chrysocephalus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 164 (based on "Le Carouge à teste jaune d'Amérique" Brisson=Cayenne, Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 31).

SPECIMENS COLLECTED

1 ♂ ad., Santa Isabel, Rio Negro, Amazonas, Brazil, October 16, 1930.
1 ♀ ad., Chapazon, Brazo Casiquiare, Venezuela, January 31, 1931.

These specimens agree with others from British Guiana, Brazil, and Colombia ("Bogota"). The male has a longer wing, but shorter

tail and bill than the female, as may be seen from the following measurements: Male—wing 105.3, tail 97, culmen from base 22.8 mm.; female—wing 98, tail 100, culmen from base 24.2 mm.

Another example was taken at Puerto Ayacucho, Rio Orinoco, January 8, 1930, and was preserved in alcohol.

ICTERUS NIGROGULARIS NIGROGULARIS (Hahn): *Yellow Oriole*

Xanthornus nigrogularis nigrogularis HAHN, Vögel aus Asien, Afrika, Amerika und Neuholland, livr. 5, 1819, pl. 1 ("Jamaica, Mexico, and Cayenne"; type from "Brazil").

SPECIMENS COLLECTED

2 ♂ ad., Soledad, Venezuela, Dec. 4, 1929.

Both specimens are in fairly fresh plumage; one has the pale tips of the rectrices worn off on all but the outermost pair.

Compared with a long series from Colombia, Venezuela, Brazil, and British Guiana, these two individuals appear very richly tinged with orange on the sides of the throat and breast. They are well above the average in this respect (males only being considered, the females yellower).

GYMNOMYSTAX MEXICANUS (Linnaeus): *Black and Yellow Oriole*

Oriolus mexicanus LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 162 (based on "Le Troupiale brun de la Nouvelle Espagne" Brisson, Ornithologie, vol. 2, p. 105=Mexico, errore: Cayenne substituted as type locality Berlepsch and Hartert, Nov. Zool., vol. 9, 1902, p. 32).

SPECIMENS COLLECTED

1 ♀ im., Ciudad Bolívar, Venezuela, November 25, 1929.
1 ♂ im., Soledad, Venezuela, November 29, 1929.
1 ♀ ad., Puerto Ayacucho, January 4, 1930.

The two immature birds show signs of molt in the wings, and have most of the crown and occiput solid black broken in front by a yellow median intrusion from the forehead. The old (juvenal) remiges are dark clove brown, not blackish as in adults.

The adult female is a very large bird with a wing length of 135 mm. in which it is exceeded by no other in the series available for comparison, and equaled only by one from Cayenne. The size variation in this species is very great, however, and apparently has no geographic correlation.

STURNELLA MAGNA PRATICOLA Chubb: *Guianan Meadowlark*

Sturnella magna praticola CHUBB, Ann. Mag. Nat. Hist., ser. 9, vol. 8, 1921, p. 445 (Abary River, British Guiana).

SPECIMENS COLLECTED

2 ♂ ad., Puerto Ayacucho, Río Orinoco, Venezuela, May 20–21, 1931.

Although available comparative material is rather scanty (1 *praticola*, 2 *paralios*, and 9 *meridionalis*) the present specimens are

certainly referable to *praticola* on the basis of size (wings 98.5 and 99 mm., respectively), which, according to Hellmayr (Catalogue of the birds of the Americas, pt. 10, 1937, 217) is the only "absolutely constant character separating this form . . . ." They differ from the only other example of the race seen, a female from Forto do Rio Branco, Brazil, January or February (Pelzeln), in having the two dark coronal stripes and the postocular stripe much darker, fuscous black, as opposed to ferruginous streaked with black in the female. The latter specimen is in very worn and faded plumage generally.

Family THRAUPIDAE: Tanagers

TANAGRA XANTHOGASTER BREVIROSTRIS (Bonaparte): *Short-billed Euphonia*

Euphonia brevirostris BONAPARTE, Rev. Mag. Zool., ser. 2, vol. 3, 1851, p. 136 ("Colombia"=Bogotá).

SPECIMENS COLLECTED

2 ad. ♂, Rio Cauabury, Amazonas, Brazil, November 3–4, 1930.
1 im. ♂, Puerto Ayacucho, Río Orinoco, Venezuela, May 18, 1931.
1 im. ♂, San Antonio, Upper Orinoco, Venezuela, March 31, 1931.

The immature bird from San Antonio is tentatively placed in this form, but it is not certainly indentifiable. The adult males agree with a series of specimens of *brevirostris* from "Bogota" and eastern Ecuador. Judged by Hellmayr's account (Catalogue of the birds of the Americas, pt. 9, 1936, pp. 24–25) they appear to be the first actual records of the race from Brazil, although the range as stated there implies that extreme western Amazonia belongs in the range of this form. The distribution is as follows—tropical and subtropical zones of eastern Colombia, eastern Ecuador, and eastern Peru, to southern Venezuela and to British Guiana. The nominate form, which is slightly smaller, and, in the males, has the yellow cap paler, less orange, is more eastern and southern in its range, leaving quite a gap from which apparently no specimens have been collected. The two Rio Cauabury birds help a little to reduce this gap from the north.

The immature male from Puerto Ayacucho resembles the female plumage but is much yellower below and darker above.

TANAGRA CHLOROTICA TRINITATIS (Strickland): *Trinidad Euphonia*

Euphonia trinitatis STRICKLAND, Contr. Orn., 1851, pt. 2, p. 72 (Trinidad, Venezuela, and St. Thomas (errore)=Trinidad).

SPECIMENS COLLECTED

1 unsexed (♂ by plumage) Soledad, Venezuela, December 10, 1929.
4 ad. ♂, 3 ad. ♀, Puerto Ayacucho, Río Orinoco, Venezuela, May 8–19, 1931.

Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 38, footnote) has disposed of the question of Berlepsch's supposed

Orinocoan race *pileata* and has demonstrated the conspecificity of *trinitatis* and *chlorotica*. Far from being two species, the forms are not too well marked even as subspecies.

The Soledad specimen is a young bird molting into adult male plumage; the nape and upperparts of the body and wings are still green sprinkled with new dark blue feathers, and the underparts are completely adult in appearance.

TANAGRA RUFIVENTRIS RUFIVENTRIS Vieillot: ***Rufous-billed Euphonia***

Tangra rufiventris Vieillot, Nouv. Dict. Hist. Nat., nouv. éd., vol. 32, 1819, p. 426 (no locality=Iquitos, Peru).

SPECIMENS COLLECTED

1 ad. ♂, Chapazon, Brazo Casiquiare, Venezuela, January 30, 1931.
1 im. ♂, 1 im. ♀, Raudal, San Sebastián, Brazo Casiquiare, Venezuela, February 1, 1931.
1 ad. ♂, Caño Atamani, Brazo Casiquiare, Venezuela, February 6, 1931.
1 ad. ♂, San Antonio, Upper Orinoco, Venezuela, March 1, 1931.
1 ad. ♂, 1 ad. ♀, 1 im. ♂, Cerro Yapacana, Upper Orinoco, Venezuela, April 7–23, 1931.

Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 58, footnote) writes that males "from the Orinoco region, Rio Negro, Rio Madeira, and Rio Xingú, when compared to a series from eastern Ecuador and Peru, have the median underparts and the lower tail coverts deeper orange-rufous, and the sulphine-yellow lateral area in females is brighter as well as more extensive," and suggests that subdivision of this race might be justified. This should be reflected in the present series, which has been compared with a series of four adults of each sex from eastern Ecuador, kindly lent me by the American Museum of Natural History, but I cannot see the differences alluded to above.

TANAGRA PLUMBEA (Du Bus): ***Plumbeous Euphonia***

Euphonia plumbea Du Bus, Bull. Acad. Roy. Sci., Lettr. et Beaux-Arts Belgique, vol. 22, No. 1, 1855, p. 156 ("la Nouvelle Grenade," errore?).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, San Antonio, Upper Orinoco, Venezuela, March 1–2, 1931.
1 ad. ♂, 1 ad. ♀, Cerro Yapacana, Upper Orinoco, Venezuela, April 6, 1931.

Because of the rarity of this species in collections and the fact that the present five specimens appear to be the first ones recorded from the Upper Orinoco Valley, it may be of interest to give their measurements: Males—wing 48.2–49.5 (48.8); tail 26–26.8 (26.4), culmen from base 7.7–8.0 (7.8 mm.); females—wing 46.4–47.3, tail 26.9–27.0, culmen from base 7.0–7.5 mm. A female from Valle de los Monos, Mount Duida, is somewhat larger, especially in the bill—wing 48.5, tail 27.2, culmen from base 9 mm. Birds from British Guiana agree

quite well but raise the maximal measurements slightly, the wing in two males being 49 and 50 mm., and in a female 52 mm., respectively, but their other measurements do not show any difference from the Venezuelan birds. The birds of British Guiana may prove separable on the basis of color, two adult males from that country being darker, more washed with dusky orange on the midventral area and more abundantly flecked with dusky olive on the sides than Venezuelan examples. An adult female from British Guiana has the upper abdomen, sides, flanks, and under tail coverts more heavily washed with dusky olive-green and has the dorsal greenish area somewhat more pronounced, more distinct from the slate blue of the head and nape.

Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 67, footnote) writes that "birds from the Rio Negro appear to agree with others from British Guiana." A male (by plumage, not sexed by collector) from Rio Negro agrees with Venezuelan ones in the ventral coloration.

If one were to separate the British Guiana birds as a distinct subspecies the type locality of the species (and therefore of the nominate form) would have to be definitely restricted. The original type locality is generally considered to be erroneous as the species has not been rediscovered in Colombia. The next definite locality in literature is Rio Negro (Sclater, Proc. Zool. Soc. London, 1856, p. 280), but in view of the intermediate character of the bird from there, it would seem better to take a place geographically more extreme. Of course, if it were possible, the type specimen should be critically examined before deciding this point.

TANAGRELLA VELIA IRIDINA (Hartlaub): *Amazonian Tanagrella*

Tangra iridina HARTLAUB, Rev. Zool., vol. 4, 1841, p. 305 ("Prov. Mogobamba, Peru" = Moyobamba, Peru).

SPECIMEN COLLECTED

1 ad. ♀, Cerro Yapacana, Upper Orinoco, Venezuela, April 11, 1931.

The single example collected agrees with others from Upper Amazonian Brazil (Rio Negro).

CALOSPIZA CHILENSIS COELICOLOR (Sclater): *Western Paradise Tanager*

Calliste coelicolor SCLATER, Contr. Orn., 1851, p. 51 ("Anolaima," Colombia).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Chapazon, Brazo Casiquiare, Venezuela, January 30, 1931.

These specimens agree with a small series from British Guiana and "Bogota," Colombia. The measurements of these birds are smaller than those given for the race by Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 83, footnote) but the birds agree better

in color with *coelicolor* than with *paradisea*. Their dimensions are: Male—wing 72, tail 52.5; female—wing 72, tail 50 mm., while Hellmayr gives wing 76–81 (male), 74–72 (female); tail 52–60 mm.

CALOSPIZA XANTHOGASTRA (Sclater): *Yellow-bellied Spotted Tanager*

Calliste xanthogastra SCLATER, Contr. Orn., 1851, pt. 1, p. 23 ("Rio Negro").

SPECIMENS COLLECTED

1 ad. ♂, 3 ad. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, January 6–17, 1931.

The adult male has the edges of the feathers of the back bluer than do the females. Two of the four birds collected had "active gonads" indicating that the breeding season (if definite) must be sometime around January.

Comparison with specimens from "Bogota" and especially from eastern Ecuador (near Macas, Oriente), and eastern Peru (Napo) upheld Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, pp. 104–105) in synonymizing *rostrata* Berlepsch and Stolzmann with *xanthogastra*.

CALOSPIZA NIGRO-CINCTA NIGRO-CINCTA (Bonaparte): *Black-banded Tanager*

Aglaia nigro-cincta BONAPARTE, Proc. Zool. Soc. London, vol. 5, "1837"=June 1838, p. 121 ("that portion of Brazil bordering on Peru").

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, January 19, 1931.

Both specimens had the gonads in active condition.

The male has the sides and flanks darker blue than in two males and two unsexed birds from "Bogota," Colombia, four from eastern Ecuador, and three from Río Surutu, Bolivia. The São Gabriel male is also smaller than the other three, having a wing length of 63 mm. as opposed to 67 and 72 mm. in the Bogotá birds, 65.5–70.5 mm. in the Ecuadorian examples, and 71, 71.6, and 74 mm. in the Bolivian birds.

The female collected is probably not fully adult, as it is not so highly colored as the male, the breast being largely grayish instead of black and the sides and flanks more grayish also. It has a wing length of 60 mm. as against 64 mm. in a female from "Bogota," and 63.5 and 66 mm. in two from eastern Ecuador.

On the other hand, Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 127, footnote) finds "apparently no local variation in this species, birds from such widely separated localities as Roraima, the Caura Valley, and 'Bogota' agreeing with others from northern Peru."

CALOSPIZA MEXICANA MEDIA (Berlepsch and Hartert): ***Intermediate Turquoise Tanager***

Calliste mexicana media BERLEPSCH and HARTERT, Nov. Zool., vol. 9, 1902, p. 19 (Maipures, Orinoco River, Venezuela).

SPECIMENS COLLECTED

2 ad. ♀, 1 im. ♀, Puerto Ayacucho, Río Orinoco, Venezuela, January 5, 1930 and May 14, 1931.

These specimens are practically topotypical.

The immature female is indistinguishable from the adult collected at the same time except in that it is smaller (wing 66 as against 71 mm. in the adult) and in that the humeral patch is smaller and in place of the outer row of violet-tipped feathers it has buffy-tipped ones.

The race is new to the National Museum and the specimens have been identified by comparison with actual specimens of the other races, and with the original description of *media*, with which they agree in having the underparts slightly darker brighter yellow than in *mexicana*. In this they are intermediate between *mexicana* and *vieilloti*. The purplish color of the head and throat in all races of this species seems to vary according to wear.

CALOSPIZA MEXICANA BOLIVIANA Bonaparte: ***Bolivian Turquoise Tanager***

Calospiza boliviana BONAPARTE, Compt. Rend. Acad. Sci. Paris, vol. 32, No. 3, 1851, p. 30 (Guarayos, Bolivia).

SPECIMENS COLLECTED

3 ad. ♂, 1 ad. ♀, 1 im. ♂, São Gabriel, Amazonas, Brazil, January 3–12, 1931.

The immature male is like the adults in every respect.

This series agrees with specimens from "Bogota," Colombia, Ecuador, Peru, and "Brazil." Six specimens from the Lower Amazon (Diamantina to Pará) average paler on the belly and are referred to *lateralis* Todd. It may be remarked, in passing, that Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 137, footnote) considers *lateralis* as a synonym of *boliviana*. He writes that birds "from Lower Amazonia (*lateralis*) are on average paler yellow below with more heavily black spotted flanks, but so many individuals are indistinguishable from those of Bolivia that I do not see any practical advantage in maintaining the distinction by a separate name . . ." On the other hand, Griscom and Greenway (Bull. Mus. Comp. Zool., vol. 88, No. 3, 1941, p. 325) find a long series from Lower Amazonia (Tapajóz, Santarém, and Benevides) to be readily told from seven Bolivian specimens. I have seen no Bolivian birds but assume from this that the present upper Amazonian birds differ from *lateralis* just as typical *bolivianus* is said to. In other words, if there are no other differences *lateralis* would be surrounded on the north and on the

Black-collared swallows (*Atticora melanoleuca*) on rock near Isla Yagrumo, Venezuela

Sun-bittern (*Eurypyga helios*) at San Antonio, Venezuela.

south by *boliviana*, a situation which would certainly be unlikely and which would necessitate a reinvestigation of the validity of *lateralis*.

CALOSPIZA GYROLA PARVA (Zimmer): *Zimmer's Green Tanager*

Tangara gyroloides parva ZIMMER, Amer. Mus. Nov., No. 1246, 1943, p. 5 (Mount Curycuryari, Rio Negro, Brazil).

SPECIMENS COLLECTED

2 ad. ♂, São Gabriel, Rio Negro, Amazonas, Brazil, January 1–3, 1931.
1 ad. ♂, Cucuhy, Rio Negro, Amazonas, Brazil, February 7, 1930.

According to the measurements given by Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 143, footnote) for *catharinae* these specimens from the extreme northeastern part of the range of the subspecies are very small. They have wing lengths of 69, 69.5, and 70 mm., respectively, while Hellmayr's series of males (from Peru) had wings varying from 70–77 mm. in length. A male from near Macas, eastern Ecuador, has a wing length of 76 mm., two others from along the eastern Ecuadorian-Peruvian border are smaller, more like the Rio Negro birds, with wing lengths of 72–72.5 mm.; two eastern Peruvian specimens measure 74 and 76 mm., respectively, while 4 males from Colombia have wings of 71, 76, 76.7, and 80 mm. respectively. The bills are smaller and weaker in the Rio Negro birds than in east Ecuadorian specimens, a difference that is more apparent to the eye than to the calipers, but which may be expressed mensurally as follows: Width of bill at gape 8.5–8.7 in eastern Ecuadorian males, 8.0–8.2 in Peruvian birds; 7.0–7.8 in Colombian ones, and 7.0–7.5 in Rio Negro males. It may be that more extensive series would indicate a fairly constant average difference in size between the two groups. The present Rio Negro birds may be characterized as agreeing with typical *catharinae* from eastern Peru and Ecuador in coloration, and with *albertinae* of Lower Amazonia and Matto Grosso in size. Strangely enough, the Colombian, Ecuadorian, and Peruvian specimens of *catharinae* have the top and sides of the head averaging slightly paler than on the Rio Negro ones, more like *albertinae* of Lower Amazonia. In other words, they agree with the characters given by Zimmer in his establishment of *parva;* the race is recognizable although by no means strikingly marked.

CALOSPIZA CAYANA CAYANA (Linnaeus): *Rufous-crowned Tanager*

Tanagra cayana LINNAEUS, Systema naturæ, ed. 12, vol. 1, 1766, p. 315 (based on "Le Tangara verd, de Cayenne" Brisson, Ornithologie, vol. 3, 1760, p. 21, pl. 4, fig. 3: Cayenne).

SPECIMENS COLLECTED

1 im. ♀, San Antonio, Upper Orinoco, Venezuela, March 5, 1931.
1 ad. ♂, 1 ad. ♀, Cerro Yapacana, Upper Orinoco, Venezuela, March 22, 1931.
3 ad. ♂, 2 ad. ♀, 2 im. ♀, Puerto Ayacucho, Río Orinoco, Venezuela, May 13–19, 1931, and January 3, 1930.

1 ad. ♂, Soledad, Venezuela, December 4, 1929.
1 ad. ♀, Ciudad Bolívar, Venezuela, June 10, 1931.

In adult birds the edges of the remiges and their upper coverts vary from quite greenish ("bluish gray green") to bluish ("dark green blue gray"), and the forehead and anterior portion of the crown vary in the presence or absence of a sprinkling of greenish feathers among the golden tawny ones. The extent and intensity of the blue on the throat and breast are also very variable. Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 159, footnote) quotes Sclater to the effect that this blue is brighter in Peruvian birds. This is borne out by the series studied in the present connection, a bird from the head waters of the Huallaga River being the most bluish one examined. It is, however, no larger in size than Venezuelan examples, contrary to Sclater's observations.

The northern Venezuelan-Colombian race *fulvescens* Todd seems to me to be founded on rather slight characters. It is said to differ from the nominate race in being somewhat larger and paler, the coloration throughout, but especially above, being more silvery, less buffy. Two adults from Aragua and La Victoria, which, by geography, should be *fulvescens*, are doubtfully different from the present series from the Upper Orinoco.

The immature females resemble the adults of that sex but lack the orange-tawny "cap," having the top of the head like the upper back but washed with dull olive-yellow, and they also differ from adults in having the chin and throat less suffused with greenish gray.

THRAUPIS EPISCOPUS EPISCOPUS (Linnaeus): *Bishop Tanager*

Tanagra Episcopus Linnaeus, Systema naturae, ed. 12, vol. 1, 1766, p. 316 (based on "L'Evesque" Brisson, Ornithologie, vol. 3, p. 40, pl. 1, fig. 2: "Bresil"= Cayenne, Berlepsch, Nov. Zool., vol. 15, 1908, p. 115).

SPECIMENS COLLECTED

1 ad. ♀, Manáos (Flores Tramway), Amazonas, Brazil, September 27, 1930.
2 ad. ♂, 1 ad. ♀, 1 im. ♂, Santa Isabel, Rio Negro, Amazonas, Brazil, October 9–17, 1930.
3 ad. ♂, 1 ad. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, January 2–17, 1931.
1 im. ♂, Cucuhy, Rio Negro, Amazonas, Brazil, February 6, 1930.
1 ad. ♂, 2 ad. ♀, 1 im. ♀, Puerto Ayacucho, Río Orinoco, Venezuela, May 11–19, 1931.
1 ad. ♂, Puerto Ayacucho, Río Orinoco, Venezuela, January 6, 1930.

A study of the present fine series, together with a larger one still, reveals so much individual variation in the degree and extent of the whitish humeral patch and the pale edgings of the greater upper wing coverts that one is led, by inference, to question the validity of *T. e. leucoptera* (Sclater) of the eastern slope of the eastern Andes of Co-

lombia, stated by Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 207, footnote) to be a connecting link between *episcopus* and *coelestis* (Spix). On the whole, the Brazilian specimens listed above have more whitish on the wings than the four from Puerto Ayacucho, Venezuela However, one finds birds with much whitish and others of equal maturity and like sex with little or none from the same general localities in parts of the range as widely separated as British Guiana and Santarem, Brazil. In a general way it does seem that western Amazonian birds tend to have more of the whitish on the wings than do eastern ones, which suggests that possibly we have in upper Amazonia a great area over which *episcopus* and *coelestis* intergrade. Hellmayr, on the other hand, finds birds from Barcellos on the Rio Negro to agree perfectly with others from Pará and the Guianas. It also appears that *episcopus* and *cana* merge in the southern part of the Orinoco drainage, which accounts for the present specimens from Puerto Ayacucho having a somewhat intermediate coloration.

Recently Zimmer (Amer. Mus. Nov., No. 1262, 1944, p. 10) has described *T. e. mediana* from Manáos, Brazil. If valid, this would be the form to which our present species would have to be referred. However, in view of the above comments and the fact that Zimmer writes that his new form, ". . . is admittedly intermediate between *episcopus* and *coelestis*, . . ." it seems better to consider *mediana* a synonym of the nominate form.

THRAUPIS EPISCOPUS CANA (Swainson): ***Gray Tanager***

Tanagra cana Swainson, Ornithological drawings, pt. 3, 1836, pl. 37 (no locality indicated="Venezuela," suggested by Berlepsch, Verh. 5th Internat. Orn. Kongr. Berlin, 1912, p. 1051, restricted to Caracas by Hellmayr, Arch. für Naturg., vol. 90A, No. 2, 1924, p. 185).

SPECIMEN COLLECTED

1 ad. ♀, Ciudad Bolívar, Venezuela, June 8, 1931.

The specimen is in rather worn plumage.

THRAUPIS PALMARUM MELANOPTERA (Sclater): ***Amazonian Palm Tanager***

Tanagra melanoptera Sclater, Proc. Zool. Soc. London, vol. 24, "1856" (=1857), p. 235 (east Peru and "Bogota"=eastern Peru).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Santa Isabel, Rio Negro, Amazonas, Brazil, October 9–15, 1930.

3 ad. ♂, São Gabriel, Rio Negro, Amazonas, Brazil, January 6–10, 1931.

1 ad. ♂, Cucuhy, Rio Negro, Amazonas, Brazil, February 3, 1930.

1 ad. ♂, 1 ad. ♀, Chapazon, Brazo Casiquiare, Venezuela, January 30, 1931.

1 ad. ♀, San Antonio, Upper Orinoco, Venezuela, March 3, 1931.

1 ad. ♂, 2 ad. ♀, 1 im. ♂, Puerto Ayacucho, Río Orinoco, Venezuela, May 11–20, 1931.

All but one of the Venezuelan specimens listed above are more greenish, less bluish gray on the upper back than the Brazilian birds, a difference difficult to fully explain by their more abraded plumage. The Brazilian birds agree with a specimen from near the type locality of *melanoptera* in eastern Peru. Specimens from the lower Amazon and from the Guianas are intermediate between typical *palmarum* and *melanoptera;* on the whole it seems that lower Amazonian birds are *palmarum* while Guianan examples are nearer to the present race.

Hellmayr (Catalogue of the birds of Americas, pt. 9, 1936, p. 228, footnote) writes that the characters of *melanoptera* are most strongly pronounced in birds from Upper Amazonia. Birds from the Orinoco Basin, Trinidad, the Guianas, and Brazil north of the Amazon he finds inseparable although varying somewhat in the direction of the nominate subspecies. There seems to be considerable individual variation in the degree and extent of purplish or bluish gray on the upper back and breast. The most purplish bird seen is the most nearly topotypical—a specimen from the headwaters of the Hualloga River, Peru. It is matched above by several of the present series from Rio Negro, but exceeds them in the ventral violaceousness.

RAMPHOCELUS CARBO CARBO (Pallas): *Silver-beaked Tanager*

Lanius (*Carbo*) Pallas, *in* Vroeg's Catalogus, Adumbratiunculae, 1764, p. 2 ("Surinam").

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, 2 unsexed (= ♀?), Manáos, Amazonas, Brazil, September 26–30, 1930.

1 ad. ♂, Barcellos, Rio Negro, Amazonas, Brazil, October 6, 1930.

1 ad. ♂, Santa Isabel, Rio Negro, Amazonas, Brazil, October 9, 1930.

5 ad. ♂, 1 im. ♂, 1 im. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, January 2–16, 1931.

1 ad. ♂, 1 ad. ♀, 1 (im. ?) ♀, Cucuhy, Rio Negro, Amazonas, Brazil, February 1–3, 1930.

1 ad. ♂, Brazo Casiquiare, Caño Atamoni, Venezuela, February 6, 1931.

1 ad. ♂, 1 im. ♂, 2 im. ♀, San Antonio, Upper Orinoco, Venezuela, March 3–8, 1931.

1 ad. ♂, Puerto Ayacucho, Río Orinoco, Venezuela, January 2, 1930.

4 ad. ♂, 2 im. ♂, 3 ad. ♀, Puerto Ayacucho, Río Orinoco, Venezuela, May 13–20, 1931.

Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 254, footnote) observes that birds from the Upper Orinoco are intermediate between *carbo* and *venezuelensis*, and that "it is a matter of personal preference to refer them to one rather than the other race." This may be true of adult males, but the females of the two forms seem to be quite readily differentiated; in *venezuelensis* the females are more reddish, between chestnut and mahogany red, less cinnamomeous; in *carbo* more brownish, the abdomen ferruginous.

One of the males from São Gabriel, January 2, is molting into adult plumage.

A juvenal bird collected on the Rio Negro on February 1, 1930, was preserved in alcohol. It is not listed with the skins mentioned above.

PIRANGA RUBRA RUBRA (Linnaeus): ***Summer Tanager***

Fringilla rubra Linnaeus, Systema naturae, ed. 10, vol. 1, 1758, p. 181 (based on "The Summer Red-Bird" Catesby, The natural history of Carolina . . ., vol. 1, p. 56, pl. 56: "Carolina and Virginia"=South Carolina).

SPECIMENS COLLECTED

1 ♀ ad., Puerto Ayacucho, Venezuela, January 5, 1930.

1 ♂ ad., Raudal Corocoro, just below Playa Candela, Casiquiare, Venezuela, February 9, 1931.

The crown, occiput, and upper back of the female have a number of reddish-brown feathers showing among the greenish ones, and some of the longer upper tail coverts are similarly reddish brown.

PIRANGA FLAVA HAEMALEA Salvin and Godman: ***Roraima Red Tanager***

Pyranga haemalea Salvin and Godman, Ibis, 1883, p. 205 (Roraima, British Guiana).

SPECIMEN COLLECTED

1 ad. ♀, Serro Imeri, near Salto do Huá on the Venezuelan-Brazilian border, December 7, 1930.

This rather puzzling specimen seems to fit best with *haemalea*, but the identification is not so certain as might be hoped for. It is similar to a female of *desidiosa* but has the throat brighter yellow and the forehead and crown darker brownish olive. Its dimensions are as follows: Wing 90.5, tail 77, culmen from base 18.6 mm. The nearest point to Serro Imeri whence the race (or the species) has been recorded hitherto seems to be Mount Duida.

HABIA RUBICA PERUVIANA (Taczanowski): ***Peruvian Red Ant-tanager***

Phoenicothraupis peruvianus Taczanowski, Ornithologie du Pérou, vol. 2, 1884, p. 498 (Chyavetas, Chamicuros, Yurimaguas, and Monterico=Yurimaguas).

SPECIMEN COLLECTED

1 ♂, São Gabriel, Rio Negro, Amazonas, Brazil, January 14, 1931.

This specimen is labeled as an adult, but it may be really an immature bird. It agrees in coloration very closely with a female from Villa Braza, Rio Tapajós, Brazil, except for the color of the tail, and in having a few faint orange flecks on the throat and in having the thighs and under tail coverts darker and more brightly orange. The tail is similar to that of an adult male from Hyutanahan, Rio Purús, Brazil. Its measurements are: Wing 83; tail 70.5; culmen from cere 17 mm. It is unfortunately in a plumage that is useless for subspecific determination but appears to be best placed in *peruviana*, although it comes from a locality a little more northerly than *peruviana* has been recorded hitherto.

TACHYPHONUS RUFUS (Boddaert): ***Greater White-shouldered Tanager***

Tangara rufa BODDAERT, Table des planches enluminéez . . ., 1783, p. 44 (based on "Le Tanagroux de Cayenne" Daubenton, Planches enluminées . . ., pl. 711: Cayenne (=female)).

SPECIMENS COLLECTED

2 ad. ♂, 1 ad. ♀, Puerto Ayacucho, Orinoco, Venezuela, May 11–20, 1931.

1 ad. ♂, 2 im. ♂, Ciudad Bolívar, Venezuela, November 25, 26, 1929, and June 10, 1931.

One of the immature males is indistinguishable from the adults, the other has a few of the brownish juvenal feathers left in the wings, cheeks, throat, breast, and abdomen.

TACHYPHONUS CRISTATUS CRISTATUS (Linnaeus): ***Scarlet-crested Tanager***

Tanagra cristata LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 317 (based on "Le Tangara noir hupé de Cayenne" Brisson, Ornithologie, vol. 6, Suppl., p. 65, pl. 4, fig. 3: Cayenne).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, 1 im. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, January 3–6, 1931.

2 ad. ♀, Colombian bank of Río Negro, opposite San Carlos, Venezuela, January 30, 1931.

1 ad. ♂, 1 ad. ♀, 1 im. ♀, Chapazon, Brazo Casiquiare, Venezuela, January 30, 1931.

1 ad. ♀, Brazo Casiquiare, Caño Atamoni, Venezuela, February 6, 1931.

1 im. ♀, Brazo Casiquiare, near Caño Durutomoni, Venezuela, February 19, 1931.

1 ad. ♀, Isla Temblador, Upper Orinoco, Venezuela, February 25, 1931.

6 ad. ♂, 1 ad. ♀, 1 im. ♂, Cerro Yapacana, Upper Orinoco, Venezuela, April 2–25, 1931.

The scarlet-crested tanagers inhabiting the Upper Orinoco Valley have been the subject of divergent opinions by investigators. Chapman (Bull. Amer. Mus. Nat. Hist., vol. 55, 1926, p. 680) found that eight males from Maipures and Suapure, Upper Orinoco, had much larger bills and slightly smaller and deeper crests than a series from eastern Ecuador and from Cayenne. He wrote that he considered these Orinoco birds separable, but in default of Bogotá specimens of "*cristatellus*" Sclater, he was not able to decide if that name should be used or a new one coined for them. Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, p. 327, footnote), on the other hand, found that birds from the Caura Valley, Venezuela (east of the Upper Orinoco!), and the Upper Rio Negro could not be satisfactorily separated from a series of "Bogota" skins (*cristatellus*)! Unfortunately the comparative material available for study in the present connection does not permit me to decide between these two opinions. Inasmuch as Hellmayr apparently had the critical material lacking to Chapman, and also topotypical Cayenne birds, I follow the former's conclusions.

The immature male, taken January 30, at Chapazon, is in an early state of postjuvenal molt. Young birds of both sexes resemble the adult females but are less rufescent above and below.

In the collections of the U. S. National Museum is a specimen received many years ago from Boucard. It bears, on the Boucard's Museum label, the locality "Lojas, Aequatur" and the date 1889. Although unsexed, it is an adult male by plumage. Aside from the fact that Lojas is in southwestern Ecuador, a region outside the known range of the species, the specimen is peculiar in that the crest is orange, not red, nearest in color to that of the race *intercedens* Berlepsch, but has the very narrow gular mark as in *huarandosae* Chapman.

An additional specimen taken in São Gabriel, January 21, 1931, was preserved in alcohol.

TACHYPHONUS PHOENICIUS Swainson: ***Red-shouldered Tanager***

Tachyphonus phoenicius Swainson, Animals in menageries, 1837, p. 311 (believed to be from "Fernando Po, on the African coast," errore=eastern Peru="Cayenne" (?)).

SPECIMENS COLLECTED

9 ad. ♂, 5 ad. ♀, Cerro Yapacana, Upper Orinoco, Venezuela, March 22–April 23, 1931.

This fine series agrees with other specimens from British Guiana. Apparently these specimens extend the known range of the species a little to the northwest. Previously this tanager was known only from two Venezuelan localities—San Carlos (Río Guainia) and Mount Duida. Its range extends from the three Guianas, through northern and central Brazil to southern Venezuela and eastern Peru.

A number of the specimens were marked as having the gonads enlarged.

TACHYPHONUS SURINAMUS BREVIPES Lafresnaye: ***Western Fulvous-crested Tanager***

Tachyphonus brevipes Lafresnaye, Rev. Zool., vol. 9, 1846, p. 206 (Colombia="Bogota").

SPECIMENS COLLECTED

1 ad. ♀, Cachoeira Manajó, Rio Cauabury, Amazonas, Brazil, October 30, 1930.

1 ad. ♂, Rio Cauabury, Amazonas, Brazil, November 4, 1930.

3 ad. ♂, 1 ad. ♀, 1 im. ♀ Serra Imeri, Rio Maturacá, Brazil (near Venezuelan border, near Salto do Huá), November 27–December 5, 1930.

2 ad. ♂, São Gabriel, Rio Negro, Amazonas, Brazil, January 3–9, 1931.

2 ad. ♂, 1 ad. ♀, 1 im. ♀, Cucuhy, Rio Negro, Amazonas, Brazil, February 1–7, 1930.

5 ad. ♂, 2 ad. ♀, Cerro Yapacana, Upper Orinoco, Venezuela, March 18–April 22, 1931.

All of these birds seem to be referable to *brevipes*, which is not exactly in harmony with the account of the races given by Hellmayr (Catalogue of the birds of the Americas, pt. 9, 1936, pp. 333, 334).

He writes that the nominate form occurs in French, Dutch, and British Guiana, "west to the adjoining parts of Venezuela (Orinoco Delta and Caura Valley) south to the north bank of the lower Amazon, Brazil (Obidos, Manaos)," while he records *brevipes* from the upper stretches of the Rio Negro to eastern Peru. In other words, Hellmayr suggests that *brevipes* occurs on the Upper Rio Negro while *surinamus* is the bird to the north of it in the Caura Valley and also to the south of it at Manáos. I have seen no birds from either locality, but the present series agree with topotypical "Bogota" *brevipes* and differs from typical Guianan examples of *surinamensis*. Either Caura Valley birds are more or less intermediate or the line of demarcation between the races in southern Venezuela must be between the valleys of the Caura and the Upper Orinoco, an area which does not seem to function as a limiting boundary for races of many other birds.

Immature females are not different in coloration from adults.

Two additional birds from São Gabriel were preserved in alcohol.

HEMITHRAUPIS FLAVICOLLIS AURIGULARIS Cherrie: ***Golden-throated Tanager***

Hemithraupis flavicollis aurigularis CHERRIE, Bull. Amer. Mus. Nat. Hist., vol. 35, 1916, p. 389 (Suapuré, Caura River, Venezuela).

SPECIMENS COLLECTED

1 ad. ♀, Salto do Huá, Venezuelan border, Brazil, November 16, 1930.

2 ad. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, December 31, 1930 and January 1, 1931.

1 ad. ♀, Chapazon, Brazo Casiquiare, Venezuela, January 30, 1931.

1 ad. ♂, 3 im. ♂, Cerro Yapacana, Upper Orinoco, Venezuela, April 3–17, 1931.

The three supposedly immature males from Cerro Yapacana are very different *inter se*, and suggest, if correctly sexed, that the male, at least, of this form goes through a very complicated plumage cycle. One of them (U.S.N.M. No. 329389) resembles the adult females but has the crown and occiput slightly darker; another (U.S.N.M. No. 329388) is similar to the first one but has the lower back, rump, and upper tail coverts yellow, not dark green; has the chin and throat brighter, more golden, yellow; and has some black remiges, upper wing coverts, and auriculars coming in; the third one is like the adult male, but has the yellow of the back, rump, and upper tail coverts a little paler, less tinged with orange. It may be that the first of these is the true juvenal plumage, the second merely a stage of the post-juvenal molt, and the third the first adult plumage, differing from subsequent ones only in the shade of the yellow on the back and rump. The females show less variability, the chief variable being the extent of yellowish suffusion on the abdomen.

THLYPOPSIS SORDIDA ORINOCENSIS Friedmann: ***Orinoco Orange-headed Tanager***

Thlypopsis sordida orinocensis FRIEDMANN, Proc. Biol. Soc. Washington, vol. 55, 1942, p. 85 (Isla Orocopiche, near Soledad, Orinoco River, Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♀, Isla Orocopiche, Venezuela, December 1, 1929.
1 im. ♂, Soledad, Venezuela, December 7, 1929.

The adult male from Isla Orocopiche is the type of this form. The few adults of this subspecies I have seen have been very variable in the darkness or lightness of the orange head. The type is the yellowest, especially on the forehead, and the most tinged with olive on the orange of the occiput; a male from Capuchin is the brightest orange (and also the lightest); a female from El Fraile is the duskiest on the posterior crown and occiput. All agree, however, in the grayness of the back and in their small size.

The two immature birds are olive-green above, somewhat lighter and more yellowish on the head than on the back, with yellow and superciliary lines meeting in front at the base of the bill. They have the sides of the head yellowish, the cheeks and auriculars flushed with olive, and have the chin, throat, breast, most of abdomen, sides, and flanks yellowish. The young male is generally brighter yellow than the female and has the yellow extending over the lower abdomen and under tail coverts, which are whitish in the young female.

As stated in the original description, this race is similar to typical *sordida* but has the upperparts purer gray, less olivaceous, the general tone deep grayish olive (as opposed to dark citrine in the nominate race) and is slighly smaller (wings in the males 67–68 mm. in *orinocensis;* 70–71 mm. in *sordida*).

Family FRINGILLIDAE: Finches

SALTATOR MAXIMUS MAXIMUS (P. L. S. Müller): ***Lesser Buff-throated Saltator***

Tanagra maxima P. L. S. Müller, Natursystem, Suppl., 1776, p. 159 (based on "Tangara, des grands bois de Cayenne" Daubenton, Planches enluminées . . ., pl. 205: Cayenne).

SPECIMENS COLLECTED

1 imm. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 13, 1930.
2 ad. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 5–15, 1931.
1 ad. ♂, Venezuela, Playa de Candela, Brazo Casiquiare, February 8, 1931.
2 ad. ♂, 2 ad. ♀, Venezuela, Puerto Ayacucho, Río Orinoco, May 14–19, 1931, and January 4, 1930.

These specimens reveal considerable individual variation in the amount of green on the crown, in the intensity of the ochraceous tone on the under tail coverts, and in the length of the bill. The last-named character varies from 20–24 mm. in females, and from 18.5–22 mm. in males (culmen measured from the base).

SALTATOR COERULESCENS BREWSTERI Bangs and Penard: ***Brewster's Saltator***

Saltator olivascens brewsteri Bangs and Penard, Bull. Mus. Comp. Zool., vol. 62, 1918, p. 91 (Caparo; Trinidad).

SPECIMENS COLLECTED

4 ad. ♂, Venezuela, Ciudad Bolívar, June 8–10, 1931.

1 ad. ♀, 1 ad. ♂, 1 im. ♀, Venezuela, Soledad, Estado Anzoátegui, December 4, 1929, and June 12, 1931.

1 im. ♀, Venezuela, Puerto Ayacucho, January 6, 1930.

In the color of the upperparts these specimens approach *olivascens* Cabanis from the Guianas and extreme northern Brazil. A molting adult male taken at Ciudad Bolívar, June 9, has many of the old feathers of the upperparts, auriculars, wing coverts, the outer edges of the primaries and secondaries, and a few of the breast, flank, and abdominal feathers washed with green. The immature female from Soledad is very greenish above and below. I have seen a similarly greenish, but somewhat paler, example of *S. c. plumbeus*, so this virescent immature plumage appears to hold for the species as a group and not merely for the present race.

One of the males from Ciudad Bolívar has the white superciliaries much reduced, approaching the race *plumbeus* in this respect. It is also darker, more brownish above than the other three collected at the same time and place.

All the June specimens are in very worn plumage or in molt; the December birds are in fairly fresh feathering.

SALTATOR ORENOCENSIS ORENOCENSIS Lafresnaye: *Orinocoan Saltator*

Saltator orenocensis Lafresnaye, Rev. Zool., vol. 9, 1846, p. 274 ("l'embouchure de l'Orenoque," Venezuela).

SPECIMENS COLLECTED

1 ♂ im., 1 ♂ ad., 2 ♀ ad., 1 ♀ im., Soledad, Venezuela, November 29, December 4, 1929, and June 11, 1931.

1 ♂ ad., 1 ♀ ad., Ciudad Bolívar, Venezuela, June 8–9, 1931.

This series has been compared with two females from farther north in Venezuela by Wetmore (Proc. U. S. Nat. Mus., vol. 87, 1939, pp. 256–257), who found his two from near Parapara, Estado Guárico, and from near El Sombrero, respectively, to have heavier bills. The bird from near Parapara is virtually a topotype of *S. o. rufescens* Todd; its measurements are:—wing 87.5, tail (molting) 82.5, exposed culmen 19, depth of bill 12 mm. Another female collected by Cherrie at Altagracia on the far northwest coast of Venezuela measures: Wing 88, tail 82, exposed culmen 18, depth of bill 12 mm. The Altagracia bird has a good deal of buffy wash on the breast and abdomen which is lacking in the Parapara specimen. However, it can be matched by two immature birds from Soledad. It is unfortunate that Tocuyo was chosen as the type locality for *rufescens* as topotypes may prove to be indistinguishable from *orenocensis*. Specimens from farther to the west, however, are distinguishable on the basis of a greater extent of buffy wash on the underparts.

The four specimens collected in June are in very worn plumage; the young male taken on December 4 is completing its tail molt and is otherwise in fresh plumage as are also the other December and late November specimens. The worn-plumaged examples are much whiter, less washed with tawny-buff on the breast and upper abdomen than are the three in fresh feathering. This may, to some extent, account for what Hellmayr (Catalogue of the birds of the Americas, pt. 11, 1938, p. 28, footnote) refers to as "some local variation."

CARYOTHRAUSTES CANADENSIS CANADENSIS (Linnaeus): *Green Grosbeak*

Loxia canadensis LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 304 (based on "Le Gros-bec de Cayenne" Brisson, Ornithologie, vol. 3, p. 229, pl. 11, fig. 3: "Canada" (lapsus) = Cayenne).

SPECIMENS COLLECTED

1 ♀, Brazil, Rio Cauabury, below mouth of Rio Maturacá, Amazonas, November 7, 1930.

2 ♂, 1 ♀, Brazil; Serra Imeri, Brazil-Venezuela line, November 28–December 3, 1930.

2 ♂, 1 ♀, Brazil; Cucuhy, Rio Negro; February 5–8, 1930.

1 ♂, Venezuela; Cerro Guanari, Brazo Casiquiare, February 4, 1931.

1 ♀, Venezuela; Cerro Yapacana, Upper Orinoco, April 18, 1931.

The birds collected in February and April were in breeding condition, the collectors having noted on the labels "active gonads."

This series exhibits fairly great variability in the size and stoutness of the bill and in the length of the wing (85 to 93 mm. in the males) but the variations are nongeographic. All the birds are adults.

The Venezuelan specimens extend the range of this race to a new northern limit. Hellmayr (Catalogue of the birds of the Americas, pt. 11, 1938, pp. 46–47) does not include Venezuela in its range but writes in a footnote, "Whether the trade skins in the Berlepsch collection supposed to be from the 'Orinoco delta' really came from Venezuela remains to be corroborated." The present two specimens from Cerro Guanari and Cerro Yapacana, while far from the Orinoco Delta in origin, yet are steps toward validating the data on the Berlepsch skins.

These specimens have been compared with a good series of this race and with three adults of *C. c. brasiliensis*.

An additional specimen, taken on the Rio Cauabury, November 7, 1930, is preserved in alcohol.

PITYLUS GROSSUS GROSSUS (Linnaeus): *White-throated Grosbeak*

Loxia grossa LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 307 (based on "Le Gros-bec bleu d'Amerique" Brisson, Ornithologie, vol. 6, suppl., '89, pl. 5, fig. 1: "America" = Cayenne).

SPECIMENS COLLECTED

5 ♂, 4 ♀ Brazil; Saõ Gabriel, Rio Negro, Amazonas, January 1–16, 1931.

1 ♀, Brazil; Rio Cauabury, Amazonas, October 31, 1930.

1 ♂, Brazil; Serro Imeri, Brazil-Venezuela line, December 2, 1930.
1 ♀, Venezuela; Chapazon, Brazo Casiquiare, January 30, 1931.
1 ♀, Venezuela, Brazo Casiquiare, mouth of Caño Atamoni, February 6, 1931.
1 ♂, Venezuela, Brazo Casiquiare, below mouth of Río Pacila, February 13, 1931.
1 ♀, Venezuela, Upper Orinoco, near Cerro Cariche, February 24, 1931.

Hellmayr (Catalogue of the birds of the Americas, pt. 11, 1938, p. 55) writes that females from northern Brazil to Peru are generally more strongly washed with brownish underneath than in birds from the Guianas, although males from these areas are indistinguishable. I have compared the present fine series with a good number of others and find that, if anything, females from British Guiana are more brownish, less olive, underneath than are north Brazilian examples! There is then, no constant color difference on which to attempt further subdivision of this race.

The present series adds considerably to the known range of this bird in Venezuela. Hellmayr records it only from the Caura Valley, nearly 200 miles to the east of the Brazo Casiquiare.

PAROARIA GULARIS NIGRO-GENIS (Lafresnaye): ***Black-eared Cardinal***

Nemosia nigro-genis LAFRESNAYE, Rev. Zool., vol. 9, 1846, p. 273 ("l'embouchure de l'Orenoque," Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, 2 ad. ♀, Venezuela, Soledad, December 4, 1929, and June 11, 1931.
1 ad. ♂, Venezuela, Ciudad Bolívar, June 8, 1931.
1 unsexed, Venezuela, Isla Orocopiche, near Soledad, December 1, 1929.

A male, labeled adult, from Soledad, collected on June 11, is in a late stage of the postjuvenal molt, the old feathers of back and wings being earth brown. It has a number of the red coronal and occipital feathers tipped with bluish black. The other Soledad male, in full plumage, has a few faint blackish edgings on the tips of the white breast feathers.

CYANOCOMPSA CYANOIDES ROTHSCHILDI (Bartlett): ***Rothschild's Blue Grosbeak***

Guiraca rothschildii (*i*) BARTLETT, Ann. Mag. Nat. Hist., vol. 6, 1890, p. 168 (River Caramang, British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, 1 ad. ♀, Rio Maturacá, Amazonas, Brazil, November 9–11, 1930.
2 ad. ♂, 1 ad. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, January 9–16, 1931.
1 ad. ♀, Cucuhy, Rio Negro, Amazonas, Brazil, February 7, 1930.
1 ad. ♀, Playa de Candela, Brazo Casiquiare, Venezuela, February 8, 1931.
2 ad. ♂ (1 undoubtedly a ♀!), 1 im. ♂, Cerro Yapacana, upper Orinoco, Venezuela, April 15–22, 1931.

These four males when compared with others from British Guiana and Cayenne seem very slightly brighter, more pure bluish, less purplish blue, on the forehead and the humeral patch. The difference, however, is extremely slight.

SPOROPHILA INTERMEDIA Cabanis: ***Gray Seed-eater***

Sporophila intermedia CABANIS, Museum Heineanum, vol. 1, 1851, p. 149 (Venezuela).

SPECIMENS COLLECTED

2 ad. ♂, Venezuela, Soledad, December 10, 1929, June 11, 1931.

Both specimens are in rather abraded plumage; neither has any white on the throat; one is much darker than the other on the top of the head and is also somewhat darker on the back.

SPOROPHILA NIGRICOLLIS NIGRICOLLIS (Vieillot): ***Yellow-bellied Seed-eater***

Pyrrhula nigricollis VIEILLOT, Tabl. Enc. Méth., Orn., livr. 93, 1823, p. 1027 ("Brésil").

SPECIMEN COLLECTED

1 ad. ♀, Venezuela, Cerro Yapacana, Upper Orinoco, March 22, 1931.

The single example collected is in worn plumage.

SPOROPHILA LINEOLA (Linnaeus): ***Lined Seed-eater***

Loxia lineola LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 174 ("Asia" errore=Surinam).

SPECIMENS COLLECTED

4 ad. ♂, 1 ad. ♀, Brazil, Santa Isabel, Rio Negro, Amazonas, October 10–13, 1930.

The width of the white coronal mark is variable in the four males collected.

SPOROPHILA BOUVRONIDES (Lesson): ***Lesson's Seed-eater***

Pyrrhula bouvronides LESSON, Traité d'ornithologie, livr. 6, 1831, p. 450 (Trinidad).

SPECIMENS COLLECTED

1 im. ♂, Brazil, São Gabriel, Rio Negro, Amazonas, January 6, 1931.
3 ad. ♂, 1 ad. ♀, Venezuela, Ciudad Bolívar, June 8, 9, 1931.
1 ad. ♂, Venezuela, Soledad, June 12, 1931.

None of the four adult males have any white specks on the middle of the forehead, but have the entire upper surface dark greenish black.

Hellmayr (Catalogue of the birds of the Americas, pt. 11, 1938, p. 211) states that the female of this species is indistinguishable from that of *S. lineola*. While the material examined by me is slight, it appears that the female *bouvronides* is very slightly paler generally than that of *lineola*, but more extensive material may upset this difference.

The young male from São Gabriel is in an early stage of the post-juvenal molt, the rectrices, the innermost secondaries, and a few scattering feathers of the back and throat are of the dark adult plumage, otherwise the feathering is like that of the adult female but less ochraceous below and slightly duskier above.

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SPOROPHILA MINUTA MINUTA (Linnaeus): *Minute Seed-eater*

Loxia minuta LINNAEUS, Systema naturae, ed. 10, vol. 1, 1758, p. 176 (Surinam).

SPECIMENS COLLECTED

1 ad. ♀, Brazil, Cucuhy, Rio Negro, February 1, 1930.
1 ad. ♂, Venezuela, Puerto Ayacucho, January 6, 1930.

The male has the top of the head and the upper back dusky brownish olive. A series of a dozen males reveals about half are in this plumage while the other half have these parts cinereous; whether the latter are the truly adult birds I cannot say with certainty, but it seems that they are. The underparts in the males also vary in darkness. The present specimen is very pale, agreeing in this respect with a bird from Bogota, Colombia, and differing from others from British Guiana, Venezuela, Brazil, Colombia, Trinidad, and Tobago. The female collected, is whiter on the abdomen and less tawny, more olivaceous, above than others from Colombia, Venezuela, and British Guiana.

SPOROPHILA CASTANEIVENTRIS Cabanis: *Chestnut-bellied Seed-eater*

Sporophila castaneiventris CABANIS, *in* Schomburgk, Reisen in Britisch Guiana, pt. 3, 1848 (=1849), p. 679 (Cumaka, coast of British Guiana).

SPECIMENS COLLECTED

1 ad. ♂, Brazil, Rio Amazonas, Amazonas, September 20, 1930.
1 ad. ♂, 1 ad. ♀, Brazil, São Gabriel, Rio Negro, Amazonas, January 6–13, 1931.

These specimens have been compared with others from British Guiana, Brazil, and Peru, all of which together bear out Hellmayr's action (Catalogue of the birds of the Americas, pt. 11, 1938, p. 226, footnote) in synonymizing *S. c. rostrata* Todd with typical *castaneiventris*.

ORYZOBORUS ANGOLENSIS TORRIDUS (Scopoli): *Lesser Chestnut-bellied Rice Grosbeak*

Loxia torrida SCOPOLI, Annus I Historico-Naturalis, 1769, p. 140 (based on a bird brought alive by Jacquin to the Vienna Zoological Garden = north coast of Venezuela (Hellmayr)).

SPECIMENS COLLECTED

1 im. ♂, Providencia, Rio Negro, Amazonas, Brazil, October 7, 1930.
1 ad. ♂, San Antonio, Upper Orinoco, Venezuela, March 9, 1931.
1 ad. ♂, Puerto Ayacucho, Orinoco, Venezuela, May 12, 1931.

The two adults have wing lengths of 56 and 58.5 mm.; tail 51 and 51.5 mm., respectively, agreeing with the dimensions recorded by Hellmayr (Catalogue of the birds of the Americas, pt. 11, 1938, p. 246). The gonads were enlarged, suggesting that the birds were taken in or near their breeding season.

VOLATINIA JACARINA JACARINA (Linnaeus): *Southern Blue-black Grassquit*

Tanagra jacarina LINNAEUS, Systema naturae, ed. 12, vol. 1, 1766, p. 314 (based on "Jacarini" Marcgrave, Historiae rerum naturalium Brasiliae, p. 210: northeastern Brazil).

SPECIMENS COLLECTED

3 ad. ♂, Manáos (Flores Tramway), Amazonas, Brazil, September 26–30, 1930.

One of these specimens has somewhat less white on the axillaries than the other two, but all are nearer to the nominate than to the northern, black-axillaried race.

VOLATINIA JACARINA SPLENDENS (Vieillot): *Northern Blue-black Grassquit*

Fringilla splendens VIEILLOT, Nouv. Dict. Hist. Nat., nouv. éd., vol. 12, 1817, p. 173 (based on "Moineau, de Cayenne" Daubenton, Planches enluminées . . ., pl. 224, fig. 3: Cayenne).

SPECIMENS COLLECTED

4 ad. ♂, and 1 ad. ♀, 1 im. ♀, São Gabriel, Rio Negro, Amazonas, Brazil, December 26, 1930–January 10, 1931.
1 ad. ♂, 1 ad. ♀, Cucuhy, Rio Negro, Amazonas, Brazil, February 1, 1930.
1 im. ♂, Puerto Ayacucho, Venezuela, January 6, 1930.
1 ad. ♂, 1 ad. ♀, Soledad, Anzoátegui, Venezuela, June 11, 1931.

The immature male differs from the females in having the pectoral streaks sharper, more blackish, less brownish.

SICALIS COLOMBIANA COLOMBIANA Cabanis: *Venezuelan Yellow Finch*

Sycalis colombiana CABANIS, Museum Heineanum, vol. 1, 1851, p. 147 ("Porto Cabello," errore; Ciudad Bolívar, Río Orinoco, Venezuela).

SPECIMEN COLLECTED

1 ad. ♂, Venezuela, Ciudad Bolívar, June 10, 1931.

The only specimen obtained by the expedition, taken at the type locality, is in worn plumage.

SICALIS FLAVEOLA FLAVEOLA (Linnaeus): *Northern Yellow Finch*

Fringilla flaveola LINNAEUS, Systema naturae, ed. 12, 1766, p. 321 (Surinam).

SPECIMENS COLLECTED

1 ad. ♂, 2 ad. ♀, Venezuela, Soledad, December 7, 11, 1929, June 12, 1931.
1 ad. ♀, Venezuela, Ciudad Bolívar, June 9, 1931.

There is no appreciable difference between the sexes, but the male seems to have the orange on the forehead and forepart of the crown slightly brighter and more extensive than the females.

CORYPHOSPINGUS PILEATUS BREVICAUDUS Cory: *Short-tailed Pileated Finch*

Coryphospingus pileatus brevicaudus CORY, Publ. Field Mus. Nat. Hist., Orn. Ser., vol. 1, 1916, p. 346 (Margarita Island, off Venezuela).

SPECIMENS COLLECTED

1 ad. ♂, Venezuela, Soledad, Anzoátegui, December 11, 1929.
1 ad. ♂, Venezuela, Laguna Icacal, near Ciudad Bolívar, December 8, 1929.
5 ad. ♂, 5 ad. ♀, Venezuela, Ciudad Bolívar, June 8, 9, 11, 1931.

The June specimens are in very worn plumage, the December birds much less so.

This subspecies is not too well differentiated from the nominate form but is recognizable.

ARREMON TACITURNUS TACITURNUS (Hermann): *Pectoral Sparrow*

Tanagra taciturna HERMANN, Tabula affinitatum animalium . . . 1783, p. 214 (note) (based on "L'Oiseau Silentieux" Buffon, Histoire naturelle des oiseaux, vol. 4, p. 304, and Daubenton, Planches enluminées . . ., pl. 742: Cayenne (cf. Stresemann, Nov. Zool., vol. 27, 1920, p. 328)).

SPECIMENS COLLECTED

1 ad. unsexed, 1 ad. ♀, Rio Cauabury, Amazonas, Brazil, November 5, 1930.

4 ad. ♂, 5 ad. ♀, 1 im. unsexed, São Gabriel, Rio Negro, Amazonas, Brazil. December 31, 1930–January 17, 1931.

1 ad. ♀, Raudal Corocoro, Brazo Casiquiare, Venezuela, February 9, 1931.

1 ad. ♂, Brazo Casiquiare, below mouth of Río Pacila, Venezuela, February 22, 1931.

1 ad. ♂, Brazo Casiquiare, below Caño Caripo, Venezuela, February 22, 1931.

7 ad. ♂, 2 ad. ♀, 1 im. ♂, Cerro Yapacana, Upper Orinoco, Venezuela, March 19–April 7, 1931.

This fine series has been compared with 20 more specimens from northeastern Brazil, French Guiana, and British Guiana, and no constant geographic differences were noted. Two adult males from Ceará agree with a statement by Hellmayr (Publ. Field Mus. Nat. Hist., Zool. Ser., vol. 12, No. 18, 1929, p. 289) that east Brazilian birds have the backs of a brighter, more yellowish hue. However, birds from Bahia to the south of them and from the Guianas and the Lower Amazon to the north, are indistinguishable from one another or from Upper Amazonian birds. In a later work Hellmayr (Catalogue of the birds of the Americas, pt. 12, 1938, p. 426, footnote) makes no mention of the back color but writes that he has "yet to see from Guiana or Amazonia specimens with such an extensive grayish suffusion across chest and along flanks as is the case in *some* individuals from Bahia" and that he has been unable to perceive any other differences. I find this character to be too variable to be relied on as a possible racial trait. The unsexed adult (probably a male) from Rio Cauabury is about as heavily grayish on the chest, sides, and flanks as the grayest of a series of Bahia birds.

A young male collected at Cerro Yapacana, on April 9, shows the beginnings of adult coloration in the blackish brown auriculars and subocular stripe. There is an indication of the white supraocular stripe and a paling of the center of the crown and nape indicating the stripe to come. The throat is buffy white, the breast dark grayish buffy, this color extending over the flanks, and the abdomen is pale grayish white with a buffy tint.

The width of the black pectoral band varies greatly throughout the range of the race.

Two specimens in addition to those listed above were preserved in alcohol—one from São Gabriel, January 13, 1931, and one from near Cerro Cariche, Upper Orinoco, February 24, 1931.

MYOSPIZA AURIFRONS AURIFRONS (Spix): *Yellow-browed Sparrow*

Tanagra aurifrons Spix, Avium species novae . . . , Brasiliam . . . , vol. 2, 1825 p. 38, pl. 50, fig. 2 ("in provincia Bahia" errore = Fonte Bõa, Solimões, Brazil (Hellmayr, Nov. Zool., vol. 17, 1910, p. 281)).

SPECIMENS COLLECTED

1 ad. ♂, 1 im. ♂, Manáos (Flores Tramway), Amazonas, Brazil, September 27, 1930.

1 im. ♂, Barcellos, Rio Negro, Amazonas, Brazil, October 6, 1930.

2 ad. ♂, Santa Isabel, Rio Negro, Amazonas, Brazil, October 13, 1930.

1 ad. ♂, 1 ad. ♀, 1 im. ♂, São Gabriel, Rio Negro, Amazonas, Brazil, December 26, 1930–January 14, 1931.

1 ad. ♀, Cucuhy, Rio Negro, Amazonas, Brazil, February 6, 1930.

These examples have been compared with a series from Peru, Ecuador, and Colombia (La Morelia) and have been found to be essentially alike. The western birds are slightly darker and slightly more olivaceous above, and would be referable to *M. a. zamorae* Chapman if that form were to be recognized. The difference is slight, however, not at all as definite as the original description of *zamorae* suggests. Inasmuch as Hellmayr (Catalogue of the birds of the Americas, pt. 11, 1938, p. 484, footnote) has also found *zamorae* to be doubtfully valid, I follow his arrangement in calling these birds typical *aurifrons*.

The present specimens are about the northernmost Upper Amazonian ones yet collected.

The immature birds are very variable. Two have considerable yellow on the lores and chin, while one has none. The last has the pectoral streaks much more strongly developed than the other two, and is also smaller and may be a younger bird. It also has the edges of the remiges and their greater upper coverts and of the feathers of the upper back more ochraceous-tawny than do the other two individuals.

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(New genera, species, etc., are printed in *italics*.)

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